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ERRATA.

- Vol. 29, No. 1, p. 19, LINDBERG summary, *for* Case of Typhus seen in British India *read* Case of Eruptive Fever.
- Vol. 29, No. 5, p. 331, Reference to paper by BARBER (M. A.) & OLINGER (M. T.). *For* pp. 361–501 *read* pp. 461–501.
- Vol. 29, No. 6, p. 461, line 3 of small type: *for* Cinchoma *read* Cinchona.
- Vol. 29, No. 7, p. 532, BONNE summary, *for* As primary liver carcinoma and cirrhosis are very intimately connected, it may be that in Java alcohol is a causal factor in the production of both conditions *read* Liver cancer and cirrhosis are so constantly associated that a connexion must exist between both affections . . . It may perhaps be noted that in Java alcohol can no more be regarded as a primary factor in the causation of liver cancer than of cirrhosis itself.
- Vol. 29, No. 10, p. 719, line 8, GREEN summary, *for* “to three drops of (b)” *read* “to three cc. of (b)”.
- Vol. 29, No. 12, p. 831, last paragraph of ROUBAUD summary, *for* *Anopheles maculatus* *read* *Anopheles maculipennis*.
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TROPICAL DISEASES BULLETIN.

Vol. 29.]

1932.

[No. 1.

SPRUE.

VAN STEENIS (P. B.). Tropische spruw. [**Tropical Sprue.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. Apr. 18. 75th Year. No. 16. pp. 2113-2134. [34 refs.]

In this study, based on 18 cases, the symptomatology is well reviewed and a discussion on the pathogenesis and therapy of the disease is also included. Some of the points made are especially interesting. By means of the duodenal sound it is found that the pyloric sphincter is not strongly contracted, so that it is possible for the duodenal contents to pass back into the stomach and give rise to disturbance of gastric function. The character of the faeces is one of the most pathognomonic signs of sprue. With a diet which gives a not too frequent pulpy stool, meat and starch digestion is found to be adequate. The digestion of fat, however, is always disturbed: the stool shows much fatty acid and soaps with some neutral fat. If there is much diarrhoea the neutral fat is more abundant. A sprue stool is described in more or less identical terms by all authors as a large pasty, clayey, rising mass, full of gas bubbles, acid and usually very malodorous. The gas bubbles are in fact soap bubbles; on passage of the faeces the lighter constituents, the fat, fatty acids, soaps and air bubbles come to form a layer on the surface and this is the cause of the "rising" stool. The colour of the stool is due to fat and not, as has been maintained, to a replacement of the usual hydrobilirubin by leuco-urobilin. The chief disturbance of function takes place in the small intestine and two main theories of its etiology hold the field: (1) that of a causative organism and (2) that of a chemical fermentative process in the duodenum. It is this second possibility which has been much studied and especially its relation to pancreatic, hepatic and duodenal function. The older idea of pancreatic insufficiency as a cause has, however, been largely abandoned. In sprue bile is excreted in smaller quantity than normally and this applies to the bilirubin, the bile acids and cholesterin but most of all to bile acids. The very significant diminution of the bile salts in the bile and the fact that no accumulation in the blood and no excretion in the urine takes place make it possible that there is lessened formation of these salts. Support for this view is to be found in the examination of patients with bacillary dysentery where there may be almost complete cessation of the excretion of bile, sometimes for days, without increase

in the content of bilirubin in the blood or of urobilin in the urine. On other grounds than these also, a connexion between sprue and bacillary dysentery may be entertained. The explanation of the intestinal symptoms in sprue as due to a deficiency of the bile salts is in accordance with the fact that administration of these salts therapeutically causes their disappearance much more quickly and completely than dietetic methods alone.

Another prominent symptom of sprue is anaemia. It is however a variable symptom; it may develop early and acutely, or slowly and gradually, or sometimes suddenly after a number of years. Again, there are cases of long standing sprue where the anaemia is slight. The resemblance of sprue anaemia to pernicious anaemia is well recognized but the two are regarded as of different type by the author, the first as being much more an aplastic and to a less extent haemolytic anaemia and the second as the reverse.

Under the head of etiology reference is made to *Monilia psilosis* as the causative organism, but this view is rejected. The author seems more inclined to favour an etiological connexion between bacillary dysentery and sprue. The article concludes with some observations on treatment and especially by bile salts. This treatment apparently is not at all new, for it was favourably mentioned in a treatise by BOSCH who wrote of Indian sprue in Amsterdam in 1837. Reference is also made to its use in recent times by LISTON and the method is evidently regarded favourably by van Steenis himself, who sums up his treatment of sprue in general terms as diet, sodium taurocholate 40 mgm. five times daily, sometimes calcium preparations with parathyroid gland, liver for the anaemia, sometimes arsenic and, on occasion, blood transfusion.

W. F. Harvey.

TYNER (James D.). **Tropical Sprue : its Differentiation from Pernicious Anaemia by the Morphology of the Neutrophilic Leukocyte.**—*Clifton Med. Bull.* 1931. Apr. Vol. 17. No. 2. pp. 86-87. [3 refs.]

In a previous paper (*ante*, p. 660) the author differentiated sprue from pernicious anaemia by the Arneth count; the present paper is a development of this or, more strictly speaking, another mode of expressing the same thing. In neither case is it a means of diagnosing sprue, since in this disease the Arneth count is to all intents and purposes normal, viz., an index of 62.1 in 17 out of 20 cases of tropical sprue whereas it was 61.1 for ten normal subjects; the index in 10 cases of pernicious anaemia was 32.45.

As regards the neutrophile leucocytes in sprue, as the Arneth index shows, they are mainly of the 2-3-4 segment type, whereas in pernicious anaemia those of 5-6-7 segments are frequently encountered. The leucocytes in the latter are of larger size than normal and the nuclear segments have delicate stranding and little vacuolation. In sprue, besides the fewer and larger nuclear segments, the connecting strands are coarser and the segments themselves vacuolated. This condition is seen in any mildly toxic condition. Hence, as stated above, though useless as a diagnostic feature of sprue, the leucocyte characters are serviceable in differentiating sprue from pernicious anaemia.

H. H. S.

RAMANUJAYYA (R.). **The Incidence of Sprue amongst Indians.**—*Indian Med. Gaz.* 1930. Oct. Vol. 65. No. 10. pp. 552–553.

The author affirms that sprue is common among Indians in the district under his care in Southern India, and that typical signs present are flatulent diarrhoea and glazed tongue with superficial erosions and anaemia. He states that he “has seen many persons suffering from typical sprue,” but the five of whom he gives details are not altogether typical; thus the stools in one were copious and watery, in another green in colour, a third was constipated; three had general abdominal tenderness, one “a burning sensation all over the body.” He thinks that water supply, climate and poverty are of great aetiological importance, but adduces no evidence for this. No history of preceding dysentery, either amoebic or bacillary, was obtained. Some got well on alkalies and astringents, some on acid, others recovered spontaneously; there were no fatal cases. [Evidence is accumulating that Indians do suffer from sprue, but the statements in this paper are of too general a character to have much weight either pro or con.]

H. H. S.

MALCOMSON (G. E.) & MURTHY (K. N.). **The Frequency of Sprue among Indians in Madras.**—*Indian Med. Gaz.* 1931. Apr. Vol. 66. No. 4. pp. 192–193.

The authors state that in their experience sprue is “an extremely common disease among Indians, at any rate among Madrasis.” Most of the cases are among the well-to-do, and between 20 and 54 years of age; they saw none in children or the aged. Many gave a history of preceding dysentery, amoebic or bacillary. The symptoms detailed were morning diarrhoea, and anaemia of the pernicious type in 4 cases, while test meals showed hypochlorhydria and a van den Bergh test gave an indirect positive of $\frac{1}{2}$ to 2 units. Haemolytic streptococci were isolated from stools and urine of some of the patients [number not stated] and in four cases *Cl. welchii* from the stools, and the authors believe that one or both of these are accountable for the anaemia. [Details are not given as regards stomatitis, wasting, or physical examinations of any of the patients.]

H. H. S.

ASHFORD (B. K.). **The Relation of Monilia psilosis to Tropical Sprue and an Evaluation of Fermentation of Sugar as a Criterion for Specificity.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Mar. Vol. 6. No. 3. pp. 310–333. [School of Trop. Med., Univ. of Porto Rico, San Juan.]

It is with sincere regret that the reviewer finds himself unable adequately to summarize this article, for though it deals with no cases more recent than 1917, Professor Ashford's work calls for notice even when he is busy pursuing the wraith of *Monilia psilosis*.

In the present instance, however, the difficulty arises from the practical impossibility of following some of the statements or of reconciling the letterpress with the tables, to which the former frequently refers. The author duly notes the changes which the so-called *Monilia*

psilosis may undergo and shows how marked the differences may be in morphology, fermentation reactions and pathogeny.

Table 1 gives succinct clinical notes of cases with "typical" *M. psilosis* and Table 2 the fermentation reactions in detail of each case, together with the gross appearance of the culture and the clinical diagnosis of the disease. There are several, however, mentioned in Table 1 which are not found in Table 2 and, as regards the latter, the author states: "Table II shows that there were 114 cases from which *Monilia psilosis* was isolated; 127 of these . . . were cases of sprue." Again, "Table IV shows that of the sixty-one cases in which *Monilia psilosis* was found there were 22 cases of sprue . . ." but Table 4 is headed cases negative for *Monilia psilosis*, while Table 3 (of which there are two) gives, it is true, a list of 22 cases, but only 20 of these were diagnosed as sprue. Later, Table V is referred to, but there is no Table V presented.

On fermentation changes only Dr. Ashford speaks of six types of monilia; in two instances he succeeded in making atypical strains typical by animal passage and infers that among the 61 cases in which monilia was found "some of these aberrant strains might have been degraded forms of *Monilia psilosis*" [a conclusion with which no one will quarrel]. He agrees with FAIRLEY and MACKIE that "in fifty per cent. of those cases not clinically sprue, a typical *Monilia psilosis*, or some nearly related atypical form thereof, has been found in the faeces," so we must look forward with patience to the time when some sort of proof is adduced, beyond mere clinical association, that *Monilia psilosis* has some aetiological connexion with sprue, and in the meantime experiment can be pursued without record in the literature until some definite results, positive or negative, can be reported.

It is gratifying to see that Dr. Ashford knocks another nail in the coffin of the oft-repeated but unwarranted deduction that "sprue is nothing but a form of dysentery" based merely on the fact that in some cases sprue is preceded by dysentery; indeed, he states, "the very diet employed to cure dysentery may provoke sprue." Far too many misprints have escaped the vigilance of the proof reader.

H. H. S.

EFREMOW (V.). Zur Frage der Pathogenität des Moniliapilzes und seiner Rolle im Spruesymptomenkomplex. [**The Pathogenicity of *Monilia* and their Role in Sprue.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Oct. Vol. 35. No. 10. pp. 592-606. [48 refs.] [*Trop. Inst. of S.S.R. Armenia, Erivan.*]

The author precedes the detailed account of his own researches by a brief description of the history of sprue and more minutely and with great fairness an epitome of the work of others on *Monilia* in connexion with this disease during the last 20 years or so. His own work has been carried out on 6 cases of sprue, one of pernicious anaemia and one of amoebic dysentery. From the faeces of 5 sprue patients he isolated 4 strains of the *M. psilosis* Ashford type and a similar organism from the case of dysentery. From the other two patients he isolated two strains not conforming to that type; he names these *M. armeniensis*. The method of isolation, characters of growth and fermentation reactions are stated, followed by an account of numerous animal experiments on rabbits, guineapigs and white rats.

Intravenous inoculation of large doses into rabbits caused rapid death with high temperature, dyspnoea and convulsions; smaller doses gave rise to fever and wasting, with necrosis, abscesses and granuloma-like formations in kidneys, liver and spleen. Subcutaneous injection in small doses into rats and guineapigs set up small local abscesses which burst and healed. Feeding rats for a month on a vitamin C deficient diet and cultures of the *Monilia* produced no positive result. The post mortem findings in those animals which died or were killed are described. The author concludes that "*M. psilosis* and *M. armeniensis* are not completely harmless commensal symbionts, but are capable under certain conditions of time and place (ad hoc et ex tempore) of setting up widespread changes in the tissues", but that "*Monilia psilosis* Ashfordi does not appear to be the specific cause of sprue", that "*M. psilosis* and the allied *M. armeniensis* proved virulent for experimental animals producing marked reaction in the reticulo-endothelial system in the form of infective granuloma", and finally that *Monilias* which find conditions suitable for their growth and development "doubtless play a part in disturbing the nutritional balance."

H. H. S.

ENGEL (Arthur). **A Case of So-Called Sprue.**—*Acta Med. Scandinavica*. 1931. Vol. 75. No. 3-4. pp. 341-359. With 4 figs. (1 folding). [38 refs.] [1st Med. Clinic of Serafimerlasarettet, Stockholm.]

The author describes in great detail and discusses with care and restraint a case presenting a typical picture of sprue. He precedes this with an account of tropical sprue in which he considers the symptoms individually, giving due credit to the work of British investigators. This account embodies most of the recent researches, but when speaking of the blood changes and the differences between pernicious anaemia and that of sprue, he makes no mention of the Arneth index which is low (about 33) in the former, usually normal or thereabouts (60+) in the latter. He also states that the cause of the frothiness of the stools is not known, beyond the fact that this character is not due to carbohydrate fermentation or decomposition of proteins; that it may be due to "soap bubbles" from the splitting up of the fats is not referred to.

The case described is of great interest: The woman, a teacher, was born in 1888, a native of Sweden. At the age of 31 suffered with severe diarrhoea with mucous stools, 15-20 in 24 hours. She recovered from this attack, but 4 years later had for a fortnight "diarrhoea with stools of a rice-water appearance." During the next 3 years (1924-27) she travelled round the world, visiting parts where sprue is known to be endemic. In 1925 she had a return of the diarrhoea and in 1926, in New Zealand, had a sore tongue. In 1927, the diarrhoea was severe, with passing of blood, and she became anaemic and emaciated. When seen by the author in 1929 she was having 10-15 frothy motions daily, the red cells were below 3 million, Hb 74 per cent. During the next 15 months her general condition varied but on the whole tended to deteriorate and in October 1930, the red cells were 1,480,000 per cmm., Hb 47 per cent., the anaemia being of the megalocytic type; the faeces showed "a moderate amount of neutral fat and a large amount of fatty acid crystals" [the actual figures are not given nor the ratio]; her mouth and tongue were inflamed and painful, the serum Ca was low and symptoms of tetany were

present. In short, she presented all the classical indications of sprue. She improved somewhat on high protein diet with abundant supply of vitamins C and D.

The author concludes: "Whether the patient acquired the disease in known sprue areas cannot be determined. But there is no reason to dismiss the possibility of the disease having been contracted in Sweden." [Seeing, however, that until the second year of her travels the stools were not characteristic and there had been no mouth symptoms, the case cannot be regarded as one of non-tropical sprue. The early mucoid diarrhoea may have been dysenteric and have prepared the way for the supervention of sprue when the patient visited Central America or other well known sprue locality on her travels.]

H. H. S.

MARBLE (A.) & BAUER (W.). **Calcium and Phosphorus Metabolism in a Case of Nontropical Sprue with Associated Tetany.**—*Arch. Intern. Med.* 1931. Sept. Vol. 48. No. 3. pp. 515-532. With 4 figs. [33 refs.] [Massachusetts General Hosp., & Harvard Med. School, Boston.]

This article embodies the report of an interesting case of diarrhoea associated with tetany in which details are given of the blood changes and of the calcium and phosphorus metabolism, with a discussion of the conditions found. The red corpuscles were at one time reduced to nearly half (2,260,000 per cmm.), haemoglobin 50 per cent., and white corpuscles 17,300. The anaemia was not of the megalocytic type, the average size was 7.8 microns, and there were no erythroblasts. The serum calcium was low (6.7 mgm. per cent.) and the phosphorus 1.28 mgm. The faecal values were approximately those of the intake and indicative, therefore, of impeded intestinal absorption. Rise in the serum calcium and relief from the tetany followed administration of Collip's parathormone, nevertheless the authors maintain that the condition was not due to parathyroid deficiency or dysfunction on the following grounds: Parathyroid deficiency is characterized by "a low value for serum calcium, a high value for serum phosphorus, normal excretion of fecal calcium and phosphorus, decreased excretion of urinary calcium and phosphorus and normal density of bone. Cases of tetany such as the one reported are characterized by a low value for serum calcium, a low value for serum phosphorus, increased excretion of fecal calcium and phosphorus, decreased excretion of urinary calcium and phosphorus and decreased density of bone."

The diagnosis of sprue was based on "the history of recurring attacks of diarrhoea, sore tongue, anaemia, extreme cachexia and irritability together with the large, bulky, watery and foamy, light-coloured stools." The patient had always lived in the northern part of the United States.

[The question of non-tropical sprue is a vexed one and any evidence which can be brought to bear on the subject is welcome, but there is a growing tendency to regard patients with diarrhoea and sore mouth as suffering from sprue, ignoring other conditions in which these symptoms are associated. In the details of the clinical history recorded in this article are several which militate against the diagnosis, or, at least, symptoms neither characteristic of, nor usual in sprue. Thus, the patient had suffered for three years (following a *sudden* onset) from watery diarrhoea, up to 20 stools a day, with remissions few and incomplete. The exacerbations "were usually preceded by acute infections of the upper respiratory tract, chiefly ethmoiditis and maxillary sinusitis." Soreness of the tongue occurred the last year (i.e., two years after the onset) "at the time of the acute exacerbations of

diarrhoea." Again, "the course of the disease was febrile, with cough, sputum and pleuritic pains in the right side of the chest. Roentgenograms of the chest suggested a marked degree of bronchiectasis at the base of each lung." In short, the sudden onset, the febrile course, the watery diarrhoea, the leucocytosis, the non-megalocytic type of anaemia, the condition of the sinuses and of the lungs are all in favour of a chronic septic condition as opposed to sprue.]

H. H. S.

ASHFORD (Bailey K.). **A Case of Hypoplastic Anemia, Pernicious Type, in the Course of Sprue, with Frequently Repeated Hematological Examinations.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Sept. Vol. 7. No. 1. pp. 11–22. With 5 charts (4 on plates). [5 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

A typical case of sprue under the author's care. The main point of interest is the blood condition. At one time the erythrocytes were reported as "under a million," in June, 1930, they were 2,800,000 and in November, 1,920,000 per cmm. Professor Ashford made repeated examinations, red and white cell counts, haemoglobin readings and Price Jones curves daily. The average mean of 33 Price Jones curves gave 8.57 microns; there was considerable anisocytosis evidenced by a double dispersion of 3.81 (the normal being 2.2 or thereabouts). No megaloblasts were present. A further interesting feature was the frequent or daily excursion of red cells and haemoglobin, possibly due to action of the spleen as shown by McNEE. The patient had been given liver for the treatment of his anaemia but it appeared to increase the diarrhoea and to make him feel worse. The results of the blood examinations are plotted on a series of charts in which the figures are expressed as percentages and are not easy to interpret. The author postulates the question whether deficiency of liver hormone or of haemopoiesis is paramount in this type of anaemia, but data are not sufficient for a decision.

H. H. S.

MURTHI (K. N.). **Results of Blood Examinations in Sprue.**—*Indian Med. Gaz.* 1931. Feb. Vol. 66. No. 2. pp. 78–82.

The author has examined 27 cases of sprue, 18 European and 9 Indian, from the clinical, laboratory and therapeutic standpoints, but in this article deals with the blood changes only. Examinations were made on the day of admission to hospital. He divides the patients into two groups, those without marked anaemia and those with anaemia, but the tabular statement shows all gradations and there is no indication in the letterpress as to the number relegated to each group. The red corpuscle limits were 5,200,000 and 857,000, the white cells, 7,800 and 2,300 per cmm., the haemoglobin percentage 103 and 25. Erythroblasts were found in one patient only.

One or two general remarks are of interest: that corpuscle counts, both red and white are normally higher in Bengalees than in Europeans, but the reverse obtains as regards the haemoglobin percentage; that increase in total leucocytes with eosinophilia is a good prognostic sign, and that reticulocyte counts are important prognostically. It is stated that "most had high eosinophilia," by which the author appears to mean anything over 200–250 per cmm. or a percentage above two; for only 7 of the 27 had over 4 per cent. All these points need elaboration before they can be accepted. A point in laboratory technique is

low Ca of 9 mgm. or less, 12 were sprue patients and 1 pernicious anaemia; 6 had a value between 6 and 8 mgm., of these, 2 were sprue; and 4 had less than 6 mgm., viz., a patient with tetany following thyroidectomy, a nephritic patient, and two with severe sprue.

To epitomize: Of 15 cases of severe sprue, 2 only showed normal values, 4 had low and 4 high, and 5 had low values at first becoming high on undergoing treatment. Of 18 cases with mild or moderately severe symptoms, 5 had low values becoming high later, when treated, 5 had above 11 mgm., and 8 had normal values. Seventeen cases of pernicious anaemia were studied as control for sprue patients while the authors were investigating the differences between these two diseases; 7 had high values and only 1 was below 9 mgm. "Cases of sprue are outstanding as having low blood calcium values." [In view of the fact that SCOTT's contention was that, except in severe cases of sprue, the total calcium value was not markedly reduced, but that there was some error in calcium metabolism, a change in the proportion of ionic to combined calcium, if the authors had time and opportunity to investigate this point further, their findings would be of much interest. The agreement so far is fairly close, particularly in their confirmation that the low Ca value becomes high as the patient progresses under treatment (*loc. cit.* p. 362).]

H. H. S.

BAUMGARTNER (E. A.) & HUBBARD (Roger S.). **The Effect of Parathyroid Extract on the Blood Calcium.**—*Clifton Med. Bull.* 1931. July. Vol. 17. No. 3. pp. 143-149. [4 refs.]

Having noticed that patients suffering from various diseases, when treated with parathyroid extract, showed thereafter a high blood calcium while other patients gave an increase when on special diet but without parathyroid, the authors analysed several case records to determine what part, if any, the hormone played in producing the increase. The diseases were various, the chief being sprue and paralysis agitans. It is with the former only that we are here concerned. Of a total of 54 patients with high blood calcium (over 11.6 mgm. per 100 cc.) there were 15 suffering from sprue; details are given of 11 patients, 8 of them treated by special diet together with parathyroid extract, with or without calcium lactate, and 3 by diet only. Dealing with the former we find:

Patient 1 had a blood calcium of 6.2 mgm. on entry; after receiving 5 cc. parathormone hypodermically the calcium content was 8.4 mgm. After 4 more doses of 2 cc. it was 8.1 mgm. Dry extract was given and in a week the figure was 9.5 and in 3 weeks 12.9 mgm. Thereafter it fluctuated between 10 and 12 mgm. *Patient 2* on entry had 8.3 mgm. Calcium lactate (gr. 15 t.d.) and parathyroid extract were given and in 2 weeks the figure was 11.0 and a month later 14.7. *Patient 3*, on entry 10 mgm., after 5 weeks' parathyroid gave 14.1, a fortnight later 10 and two months later, though the lactate also was given, the calcium fell to 7.3. In two others figures of 12.0 and 11.6 were found four or more weeks after treatment, though in one no rise had been seen during the time of administration. In *Patient 6* the lactate and extract were given and the calcium content rose rapidly to 11.6 in six weeks. The other two gave irregular values, with high figures after ceasing the treatment.

Of the three on dietetic treatment only, one with 11.4 mgm. on entry, fell to 10 and rose again to 11.8 and some months later, when no longer on a strict diet, 12.1; the second rose from 8.6 on entry to 12.7 [according

to the tabular statement; the letterpress states "the highest value (11.6) was found a few days after entry"; the third, 11.6 on entry, fell to 10.7 three weeks later.

To sum up: Of the 15 sprue cases with high blood calcium 8 had been given parathyroid extract, sometimes with calcium lactate, and of 9 sprue cases with calcium above 12.1 mgm. five were given the extract and the five with the highest figures had received this treatment; but on the other hand, as already stated (Patient 3) the calcium may decrease during administration of the drug and fluctuations are not rare.

[An interesting point not considered in this article, interesting especially in view of the fact that the total fluctuated in some and was about normal and remained so in others, would be a study of the interrelations of the ionic to the combined calcium.]

H. H. S.

DENGUE.

SIMMONS (James Stevens). **Dengue Fever.**—*Amer. Jl. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 77-102. With 8 text figs. [30 refs.]

——. **Recent Advances in Our Knowledge of Dengue Fever.**—*Milit. Surgeon.* 1931. Sept. Vol. 69. No. 3. pp. 266-286. With 7 text figs. [23 refs.] [Army Med. School, Washington.]

In this paper, read at a meeting of a Research Club, the speaker pointed out that during the entire period of the American occupation of the Philippine Islands dengue had been extremely prevalent among the troops and had caused much annoyance and economic loss. Investigation into its etiology and prevention had been carried out continually and the present paper gives an account of some of this work. It had been definitely established that *Aedes albopictus* is a carrier of the virus of the disease and indeed this species of mosquito is more common than *Aedes aegypti* and is probably the chief vector in the Philippines. It was also proved by the same workers that the virus in the mosquito is filtrable, and that *Aedes* fed on suspensions of infected mosquitoes may become infective for man, thus showing that the virus of dengue need not pass through a mammalian host to render it infective for the mosquito. A study was also made of the clinical aspects of experimental dengue in over 80 cases; it was noted that the duration of the fever varied in different individuals, the average being 4-8 days. One, two, three, four, five, six, seven and nine day fevers were all produced by the same virus. Careful cytological counts were made in a series of cases and charts are displayed giving the temperature curves, the total leucocyte counts and also the differential counts and in addition the ratio of young to mature granulocytes. The chief point noted was the almost invariable leucopenia which usually began on the second day of the fever and progressed to the low point of 2,000 white cells per cmm. on the 4th to the 6th day; the leucocyte count returned to normal several days after the fever had ceased.

A marked immunity to dengue was noted among the locally recruited men, due in the opinion of the speaker to previous attacks.

Experiments on the transmission of dengue to monkeys are described.

D. Harvey.

SNIJDERS (E. P.), DINGER (J. E.) & SCHÜFFNER (W.). Over de overbrenging der Sumatraansche Dengue (2e Mededeeling). [**On the Transmission of Dengue Fever of Sumatra (2nd Communication).**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Apr. 1. Vol. 71. No. 4. pp. 345-353. With 5 figs. on 2 plates & 5 charts in text. [6 refs.]

——, —— & ——. **On the Transmission of Dengue in Sumatra.**—*Amer. Jl. Trop. Med.* 1931. May. Vol. 11. No. 3. pp. 171-197. With 8 charts & 12 figs. [7 refs.] [Path. Lab., Medan, & Inst. of Trop. Hyg., Amsterdam.]

This article brings confirmation of the results of transmission experiments by means of *Aedes aegypti* and *albopictus*, after transport from

the tropics to Holland, as reported previously (this *Bulletin*, Vol. 28, p. 619). The results of similar experiments of CLELAND in Australia, SILER in the Philippine Islands and BLANC in Greece are not only confirmed, but rendered much more conclusive by successful transmission in a locality where spontaneous dengue is absolutely excluded. The clinical features of the disease in cases linked together by experimental transmission, either by mosquitoes or by injection of blood from dengue patients, varied considerably, sometimes corresponding more to the classical type of dengue, in other instances showing more resemblance to the so-called five-day fever (VAN DER SCHEER). The authors are strongly inclined to consider both diseases as identical. The epidemiological conditions may alter and an endemic occurrence may change into an epidemic under influence of temporary abundant development of *Aedes*.

W. J. Bais.

SIMMONS (James S.), ST. JOHN (Joe H.), HOLT (Rufus L.) & REYNOLDS (Francois H. K.). **The Possible Transfer of Dengue Virus from Infected to Normal Mosquitoes during Copulation.**—*Amer. Jl. Trop. Med.* 1931. May. Vol. 11. No. 3. pp. 199–216. With 8 charts. [4 refs.] [Bureau of Science, Manila, P.I.]

A series of five experiments was carefully carried out: Female mosquitoes were fed on cases of dengue and after a suitable period for maturation of the virus batches of male mosquitoes were liberated in the cage; after some days the male mosquitoes were collected and removed to another cage where uninfected female mosquitoes were already confined. These female mosquitoes were then later fed on susceptible volunteers. In one experiment only was dengue produced in the volunteer and the evidence presented as a result of these experiments suggests that if the virus can be conveyed in this way transfer is only effected with great difficulty. The possible transfer of dengue virus from mosquito to mosquito in copulation may therefore be regarded as an unimportant and improbable means of perpetuating the virus of dengue in mosquitoes.

D. H.

HOLT (R. L.) & KINTNER (J. H.). **Location of Dengue Virus in the Body of Mosquitoes.**—*Amer. Jl. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 103–111. With 6 text figs. [Bureau of Science, Manila.]

Aedes aegypti which had been bred out in the laboratory were fed on a dengue patient; 20 days later these mosquitoes were killed and carefully dissected. The legs of ten were ground up and mixed with 0.5 cc. sterile normal human serum and injected into a volunteer. In the same way fluid from ovaries, salivary glands, stomachs and intestines of other mosquitoes from the same batch were injected into volunteers; all developed dengue after the usual incubation period. It would seem from these experiments that dengue infection in *Aedes* is not limited to any particular part of the insect but is "septicaemic" in character. It appears therefore that the period of maturation of the virus in the mosquito is one of multiplication only and not a cyclic phase.

D. H.

HARGRAVE (W. W.). **Report of Dengue Epidemic in American Samoa.**—*U.S. Nav. Med. Bull.* 1931. July. Vol. 29. No. 3. pp. 565–572. With 1 chart in text.

An historical account of the occurrence of dengue in American Samoa is given. An explosive outbreak took place in the year 1930 and no fewer than 2,842 cases were reported in the two months of May and June; nearly 50 per cent. of the native population were affected. A careful clinical description of the cases is given and the etiology of the outbreak is discussed. The difficulty, in the early stages, of differentiation from influenza is stressed since the typical rash was usually absent in Samoans.

D. H.

HAMLIN-HARRIS (R.). **The Elimination of *Aedes argenteus* Poiret as a Factor in Dengue Control in Queensland.**—*Ann. Trop. Med. & Parasit.* 1931. Mar. 31. Vol. 25. No. 1. pp. 21–29. [9 refs.] [Health Dept., City Council, Brisbane.]

Ae. aegypti, the carrier of dengue, has of late years been spreading along the railway lines in Queensland; the winter temperature here is just not cold enough to kill off all the mosquitoes in sheltered spots. Its survival is also favoured by the fact that the eggs can withstand desiccation and the larvae, as the author has shown experimentally, can survive a temperature as low as 43° F.; they lie motionless at the bottom of the jar but as soon as the temperature is raised they again become active. The spread of the mosquito has coincided with a spread of the disease in a series of epidemics causing much sickness and severe economic loss to the colony.

House to house patrol is most useful in the campaign against *Ae. aegypti* and figures are given showing the marked reduction secured by this measure. Dengue is not endemic in Queensland but is introduced from time to time from Hong Kong, Shanghai or India.

D. H.

DINGER (J. E.) & SNIJDERS (E. P.). Dengue und Gelbfieber. [**Dengue and Yellow Fever.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Sept. Vol. 35. No. 9. pp. 497–526. With 4 figs. & 9 charts in text. [26 refs.]

It has been pointed out by BONNE and others that there is a close resemblance between the group of dengue-like diseases and yellow fever, both in the clinical picture and in the fact that both are carried by the same insect vector and are due to a filtrable virus. It has also been suggested that the dengue group may produce immunity to yellow fever infection, one explanation being that some of these atypical fevers are really abortive yellow fever. Recently support has been given to these ideas by the fact that adult monkeys obtained from areas where dengue is rife are much less susceptible to yellow fever virus than are monkeys obtained in non-dengue areas. With a view to investigating this question the authors carried out the work reported in this paper, which consists in great part of detailed accounts of cases of experimental dengue; the temperature charts are given in detail and white cell counts are shown in graphic form. These experiments, carried out in a country in which the disease does not naturally occur, were on similar lines to other series already described. *Aedes mos-*

quitoes (*aegypti* and *albopictus*) were fed on dengue fever cases in Medan (Sumatra) and were then sent by ship to Amsterdam where they were kept at a temperature of 27° C. in the Tropical Institute; the mosquitoes were fed on volunteers, and in practically every case produced dengue in susceptible people. As regards the clinical picture of these cases it is pointed out that the same batch of mosquitoes produced different types of fever in different men; for instance one case might show the typical saddle-back temperature curve, another a 5-day fever, and another a continuous fever lasting 7 days; again when the blood of a 5-day fever case was inoculated into another volunteer, it might produce a saddle-back type of fever, and so on. The conclusion is that probably the 5-day fever of van Scheer and the 7-day fever of Rogers are not distinct diseases but simply aberrant forms of dengue.

Susceptibility of Monkeys to Dengue Virus.—26 monkeys, *Cynomolgus* and *Rhesus*, were inoculated with infective material, either the blood of dengue patients taken during the first 3 days of the fever or infective *Aedes* mosquitoes; 14 died, 6 from some obvious cause such as pneumonia,iliary tubercle, ulcerative colitis, but 8, which were carefully examined post mortem, all showed a similar condition, fatty degeneration of the liver and kidneys, swelling of the adrenals and small haemorrhages into the wall of the stomach; in the view of the authors these 8 monkeys died from the effects of the dengue virus. Attempts were made to convey dengue infection back from monkeys to man; on account of the fact that some of the monkeys were suffering from tubercle it was not possible to use their blood as inoculum, so laboratory bred *Aedes* were fed on the monkeys during the supposed period of infection, and then after an incubation period allowed to bite volunteers; none of these developed dengue.

Experiments designed to show that previous dengue infection in monkeys produces an immunity to subsequent injection of yellow fever virus.—Eleven monkeys were inoculated with infective dengue material and three weeks later with yellow fever virus; 3 of the monkeys developed yellow fever and died, but 8 remained quite normal and the authors consider that this marked and unusual resistance to yellow fever virus was due to the previous infection with dengue. It has been reported that white mice are susceptible to yellow fever virus, an intracerebral injection producing encephalitis in these animals. The authors inoculated large numbers of white mice in this manner with dengue virus but without any effect, and when subsequently tested with yellow fever virus all reacted; no immunity had been acquired. It was also shown that the serum of recovered dengue cases had no neutralizing effect on the virus of yellow fever when tested in monkeys and white mice.

D. H.

CATSARAS (Joh). Pathologisch-anatomische Beobachtungen zum Denguefieber.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. May. Vol. 35. No. 5. pp. 278–286.
[Evangelismos Hosp., Athens.]

TYPHUS AND UNCLASSIFIED FEVERS.

DYER (R. E.), CEDER (E. T.), RUMREICH (A.) & BADGER (L. F.).
Typhus Fever: the Rat Flea, *Xenopsylla cheopis*, in Experimental Transmission.—*Public Health Rep.* 1931. Aug. 7. Vol. 46. No. 32. pp. 1869–1870. [5 refs.]

The authors refer to previous work which has shown that the virus of endemic typhus fever has been recovered from fleas taken from wild rats trapped at typhus fever foci in Baltimore. More recently the same observation has been made in Savannah and these strains of the virus have been shown to be identical with the virus of endemic typhus recovered from a human case. The recovery of typhus virus from wild rats has also been recently reported by MOOSER and ZINSSER.

The present paper gives an account of the experimental transmission of endemic typhus in the laboratory by means of the rat flea (*Xenopsylla cheopis*). Metal and glass boxes were constructed and white rats were employed. Fleas were obtained from wild rats trapped in Baltimore. White rats were injected with typhus virus (Baltimore flea strain) and placed in cages with 50 fleas. Two weeks later six fleas were removed from the box, emulsified in normal saline and injected into two guineapigs; one of these guineapigs developed clinical typhus, and this strain was carried in guineapigs and rabbits for 3 generations; the rabbits developed agglutinins for Proteus X19 type O. Non-infected white rats were introduced into the cage and two weeks later fleas from these rats were shown to be infective for guineapigs; also these rats when killed were shown to be infective by inoculation of brain tissue into guineapigs. These and similar experiments were repeated on several occasions with the same results.

It was also shown that guineapigs immune to endemic typhus human strain were also immune to the strain used in the present series of experiments. Careful and repeated search of both boxes and rats failed to show the presence of any blood-sucking parasite other than *X. cheopis*.

D. Harvey.

KEMP (Hardy A.). **Endemic Typhus Fever. Rat Flea as a Possible Vector.**—*Jl. Amer. Med. Assoc.* 1931. Sept. 12. Vol. 97. No. 11. pp. 775–777. [6 refs.] [Med. College, Baylor Univ., Dallas, Texas.]

A number of wild rats had been trapped in an area (Henderson) in Texas where numerous cases of endemic (New World) typhus had occurred. Fleas of the species *Xenopsylla* and *Ceratophyllus* were collected from these rats, ground up in saline and injected intraperitoneally into two male guineapigs; six days later both animals showed marked swelling of the scrotum and febrile reaction. 5 cc. of blood was taken from one of these animals and injected into the peritoneum of another guineapig; at the same time the scrotum was opened and examined and the typical lesions as described following on infection with typhus virus were discovered. The second guineapig was killed on the third day of the fever and emulsions made of the brain and spleen were inoculated into other guineapigs. All these animals reacted in the typical manner and the virus was carried on through several generations (flea typhus virus). In smears made from the infected tunica Rickettsia bodies were clearly demonstrated. Crossed immunity experiments carried out with the rat flea virus and a

human typhus strain taken from the blood of cases in hospital, were successful; animals infected previously with human virus were immune to rat flea virus and *vice versa*.

D. H.

PINKERTON (Henry) & MAXCY (Kenneth F.). **Pathological Study of a Case of Endemic Typhus in Virginia with Demonstration of *Rickettsia*.**—*Amer. Jl. Path.* 1931. Mar. Vol. 7. No. 2. pp. 95–104. With 6 figs. on 2 plates. [9 refs.] [Harvard Med. School, Boston, & Dept. of Public Health & Hyg., Univ. of Virginia, Richmond.]

This was a case of endemic typhus (Brill's disease) in a farmer in Charlottesville, Virginia; he died on the eleventh day and the post mortem was carried out nine hours later. The Weil-Felix reaction was negative on admission but eleven days later the serum agglutinated proteus X19 in a dilution of 1-2560.

The muscle wall of the heart showed numerous nodules which had originated in the capillaries by a process of endothelial proliferation followed by a perivascular accumulation of macrophages and other cells. These lesions in the endocardium were similar to those described by WOLBACH and TODD in European cases. The most marked involvement was found in the brain; and characteristic diagnostic lesions were found in all sections from various parts of the organ. The earliest lesion is represented by small vessels which show prominence of the endothelium and occasional mitosis of the cells in situ. The lumen of the vessel eventually becomes obliterated and macrophages and cells of the lymphocytic series collect in the perivascular spaces. Sections of skin showed typical vascular lesions which were similar to those in the heart and brain. Although the brain was fixed in formalin, rickettsia bodies were easily found and were clearly brought out in the cytoplasm of the proliferating endothelial cells.

The interesting point was noted that when the American typhus virus is inoculated intraperitoneally into guineapigs it produces an intense reaction in the tunica vaginalis similar to that produced by the virus of Rocky Mountain fever and little or no typical reaction in the brain, whereas when the inoculation of the typhus virus is subcutaneous there is no reaction in the tunica but typical reaction is found in the brain.

D. H.

MONTEIRO (J. Lemos). Sobre a presença de *Rickettsia brasiliensis* n. sp. nas células endotheliaes da parede peritoneal em cobaias inoculadas no peritoneo com o virus do typho endemico de S. Paulo. [*Rickettsia brasiliensis* n. sp. in the Endothelial Cells of the Parietal Peritoneum of Guineapigs after Injection with the S. Paulo Endemic Typhus Virus.]—*Brasil-Médico*. 1931. Aug. 29. Vol. 45. No. 35. pp. 805–807. With 1 text fig. [12 refs.] English summary. [Butantan Inst., Butantan.]

—. Sur la présence de *Rickettsia brasiliensis* n. sp. dans les cellules endothéliales de la paroi péritonéale, chez des cobayes inoculés dans le péritoine avec le virus du typhus endémique de Sao Paulo.—*C.R. Soc. Biol.* 1931. Oct. 30. Vol. 108. No. 30. pp. 521–524. With 1 text fig. [Refs. in footnotes.] [Butantan Inst., Butantan.]

The author has shown previously that inoculation of the virus of the S. Paulo type of endemic typhus into the anterior chamber of the

eye is followed by the presence of *Rickettsia* in the endothelial cells of Descemet's membrane. In this paper he shows that intraperitoneal inoculation into guineapigs of the blood or emulsion of the brain substance of an infected animal leads to similar invasion of (or phagocytosis by) the endothelial cells of the peritoneal wall. They are depicted as coccoid or as very small rods, 0.5-1.4 microns in length, within these cells and occasionally in microphages. On the grounds that these *Rickettsiae* are found in this form of typhus and are possibly peculiar to it, the author proposes the name *Rickettsia brasiliensis*.

H. H. S.

NAGAYO (Mataro), TAMIYA (Takeo), MITAMIRA (Tokushiro) & HAZATO (Hikozeemon). Sur le virus du typhus exanthématique. [**The Virus of Typhus Fever.**]—*Bull. Office Internat. d'Hyg. Publique*. 1931. Aug. Vol. 23. No. 8. pp. 1415-1417.

In the course of their work on tsutsugamushi fever the authors used as a control similar inoculations of typhus virus into the eye of normal rabbits. Comparing these two conditions they found that the incubation period was shorter when typhus virus was injected and the changes in the small blood vessels, such as occur in all typhus lesions, were much more marked following injection of typhus virus than when the Japanese river fever virus was employed.

They also found that the virus of typhus can be passed in series in the eye of the guineapig indefinitely, whereas it dies out in rabbits after two or three subinoculations. The *Rickettsia* (typhus) can be seen in the endothelial cells of the infected eye but are not nearly as numerous as in an eye infected with tsutsugamushi virus. These *Rickettsia* are similar to the bodies described by ROCHA LIMA (*R. prowazeki*) and the authors point out that this work has for the first time definitely demonstrated these *Rickettsia* in a laboratory animal and has thus given a new opportunity for the study of these bodies. They give reasons for considering that these bodies are the true virus of typhus, reasons based on a study of the anatomy of the lesions and on the results of immunity experiments.

D. H.

HASLE. Le typhus exanthématique en Annam. [**Typhus in Annam.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. Feb. Vol. 9. No. 2. pp. 95-99. With 2 charts in text. [8 refs.] [Bact. Lab., Hué, Annam.]

Typhus has not been reported in Annam since 1908, when an outbreak occurred among some Tonkinese coolies who were working on railway construction. The author records three cases which he has recently (1929) observed in Hué. All three had typical mild attacks of fever and in all the Weil-Felix reaction was strongly positive with the indologenic strains of *Proteus vulgaris* X19 but negative with the Kingsbury strain. The author is of opinion that if laboratory methods of diagnosis were more extensively employed, cases of typhus would be discovered to be prevalent among natives in Annam.

D. H.

VIELLE (Emile) & SOUCHARD. Sur un cas de typhus exanthématique observé en Cochinchine. [**A Case of Typhus seen in Cochin China.**]—*Bull. Soc. Path. Exot.* 1931. Apr. 15. Vol. 24. No. 4. pp. 302-310. With 9 text figs. [Pasteur Inst., Saigon.]

This was a very severe and apparently typical case of typhus fever in a retired French officer employed by the Michelin Company in prospecting in Cochin China. The points of interest were that a very definite primary ulcer was discovered identical with that seen in Japanese river fever; the Weil-Felix reaction was negative during the fever but positive during convalescence but only with the non indologenic Kingsbury strain of *Proteus*; guineapigs inoculated with blood from the patient gave a marked febrile reaction after an incubation period of about 10 days and what is more remarkable the majority inoculated in series died of the infection. The authors would have called this a case of Japanese river fever had it not been for the results observed in guineapigs.

D. H.

LINDBERG (K.). Un cas de fièvre exanthématique observé dans l'Inde Britannique. [**Case of Typhus seen in British India.**]—*Rev. Méd. et Hyg. Trop.* 1931. May-June. Vol. 23. No. 3. pp. 137-140.

This was a case of fever in an English lady, the wife of a missionary in the Deccan near Poona. She had been ill for about four days and practically the entire skin was covered by a maculopapular rash. The spleen was slightly enlarged, no malarial parasites were found in the blood and a differential blood count gave:—neutrophils 69 per cent., lymphocytes 29 per cent., mononuclears 2 per cent.

It was discovered that four similar cases had occurred in the last two months, all in wives of missionaries. The fever lasted from 14 to 18 days and the eruption disappeared gradually. The Weil-Felix and Widal reactions were negative in all the cases during the fever but during convalescence a positive Weil-Felix was obtained. In one case there was history of tick bite but no "tache noire" was discovered.

D. H.

PAI (M. N.). **A Case of Tick Typhus in Poona.**—*Indian Med. Gaz.* 1931. Apr. Vol. 66. No. 4. p. 200.

The interesting point about this case was that it was met with in the same unit and in the same locality as two other cases previously described [see this *Bulletin*, Pai, Vol. 26, p. 462]. A sowar of the 3rd cavalry was admitted to hospital with high fever and later developed a profuse macular rash all over the body and on the palms and soles. The Weil-Felix reaction was negative as was the Widal reaction for typhoid and paratyphoid. A tiny sore was noted on the little finger of the left hand but there was no history of tick bite and no ticks were found on the patient.

D. H.

TROWELL (H. C.). **A Case of Kenya Typhus in a Mumias Native.**—*Kenya & East African Med. Jl.* 1931. Aug. Vol. 8. No. 5. pp. 142-144.

Typhus in Europeans in Kenya has been reported from time to time but so far not in natives.

The case reported here proved fatal after only ten days. Three days before he felt ill the patient noticed a small ulcer in the pubic region with swelling and pain in the lymphatic glands. On admission he had fever and was already passing into the typhoid state. No ulcer could be found but the left iliac glands were enlarged, soft and tender. A profuse macular rash appeared over the entire body including the palms and soles; intensive jaundice was noted and profuse bile in the stools and

urine. No Weil-Felix reaction was attempted owing to the early conclusion of the case. The Kahn reaction was negative. At post mortem examination a fine cirrhosis of the liver and parenchymatous nephritis were found but the small and large intestine were normal, thus excluding enteric infection.

D. H.

NETTER (Arnold). Existence sur le littoral méditerranéen, en dehors d'une fièvre boutonneuse transmise par le "*Rhipicephalus sanguineus*," commensal du chien, d'un typhus endémique bénin (maladie de Brill) transmis par un arthropode du rat, le "*Leionathus bacoti*." [Coexistence along the Mediterranean Littoral of Brill's Disease transmitted by a Rat Arthropod and of Eruptive Fever transmitted by the Dog Tick.]—*Bull. Acad. Méd.* 1931. June 30. Year 95. 3rd Ser. Vol. 105. No. 25. pp. 1017-1021. [21 refs.]

Four monkeys, injected with blood from cases of "benign endemic typhus" which had occurred on board ships of the French navy in Toulon, had all reacted; they were then sent to Algiers where they were injected with emulsion of brain of guineapigs which at the time they were killed were suffering from fever produced by injection of blood of cases of true or epidemic typhus; all four monkeys were found to be immune to this virus, controls reacted as usual.

The author considers that this experiment shows that the disease in the ships is a form of mild typhus similar to Brill's disease. He agrees that the recent work showing that eruptive fever can be produced in man by injection of the product of the dog tick clearly differentiates this disease from the Toulon disease and he suggests that there are two distinct diseases (1) endemic typhus carried by an ectoparasite of the rat, a mite or a flea, (2) fièvre boutonneuse, carried by the dog tick *R. sanguineus*.

D. H.

MARCANDIER, PLAZY, LE CHUITON & PIROT (R.). Transmission au singe de la fièvre exanthématique observée à bord des navires de guerre à Toulon. Ses rapports avec le typhus exanthématique. [Transmission to Monkeys of the Virus of Eruptive Fever occurring in Warships at Toulon. Comparison with Exanthematic Typhus.] *Bull. Acad. Méd.* 1931. June 23. 95th Year. 3rd Ser. Vol. 105. No. 24. pp. 1012-1015. [1 ref.]

The method employed was to inoculate the blood of patients suffering from the type of eruptive fever met with on the ships of war in Toulon harbour into monkeys which were afterwards sent across to Algiers where they were tested with inoculations of the local virus of true typhus (see above). Three experiments are described.

A large number of mites were collected from the ships in which most cases had occurred; these mites were crushed up and the fluid was injected into a monkey; this monkey did not react; tested six weeks later with typhus virus it reacted in the usual way (non-immune).

In the last experiment 15 cc. of blood from a case of fever was injected into a monkey which did not react; this monkey when tested a month later reacted to typhus virus. The authors consider that these experiments show that the fever met with in the ships in Toulon is a mild form of true typhus resembling Brill's disease and

they suggest that it is probably carried by an ectoparasite of the rat, a mite or a flea and that it differs from Marseilles eruptive fever which is carried by a tick and in which the reaction in monkeys caused by injection of blood from a case of fever does *not* immunize against subsequent injection of true typhus virus.

D. H.

PLAZY, MARCANDIER, GERMAIN & PIROT. Contribution à l'étude des rapports du typhus exanthématique et de la fièvre exanthématique. Recherches cliniques et expérimentales. [**Clinical and Experimental Comparison between Eruptive Fever and True Typhus.**]—*Bull. Acad. Méd.* 1931. July 21. Year 95. 3rd Ser. Vol. 106. No. 27. pp. 51–56. With 4 text figs. [1 ref.]

This paper was the opening one in a discussion on the identity of the virus of Toulon fever with that of true typhus. The authors bring forward clinical and experimental proof of their identity.

The patient, a sailor who had been on leave in his native Tunis, on return became gravely ill with all the symptoms of true typhus: deep stupor, profuse rash, injected conjunctivae and a Weil-Felix reaction positive in 1/3000 dilution, with later delirium. The suggestion was made to treat him with injections of whole blood from a man recently recovered from an attack of Toulon fever; accordingly 3 doses of 20 cc. of whole blood were injected intramuscularly with dramatic success, the temperature dropping by lysis, delirium disappearing and the stupor clearing up; so marked was the effect of these injections that the authors are convinced that the antibodies in the blood of the case of Toulon fever were specific for the typhus case.

As regards the experimental proof, blood from the case of typhus produced the typical febrile reaction when injected into a monkey but the same blood injected into another monkey which had nine months previously reacted to the Toulon virus showed no reaction to the typhus blood.

In the discussion that followed it was stated that the fever met with on board the ships in Toulon where no ticks could be found was probably true mild typhus and differed from the tick borne fever of Marseilles, the case of Toulon fever referred to in the paper being an example of mild typhus. One speaker referred to the recent work of DYER in America, who had shown that the virus of Brill's disease is present in rat fleas and suggested that the same might be true of the disease on the war ships, the limited number of cases being due to the fact that the rat flea only occasionally bites man and the mildness of the disease to the disease being modified by passage through the rat. [See also this *Bulletin*, Vol. 26, p. 457.]

D. H.

BLANC (Georges) & CAMINOPÉTROS (J.). La fièvre boutonneuse (fièvre exanthématique de Marseille) en Grèce. Expériences de transmission par la tique du chien (*Rhipicephalus sanguineus*). [**Eruptive Fever in Greece, Attempts to transmit it by the Dog Tick *R. sanguineus*.**]—*Bull. Acad. Méd.* 1931. Apr. 14. Year 95. 3rd Ser. Vol. 105. No. 14. pp. 620–624. [8 refs.]

This disease has now been reported in Greece and undoubtedly has been hitherto overlooked.

The authors have carried out a series of experiments to confirm the

work of DURAND, BRUMPT and others on its transmission by the tick *R. sanguineus*. Their first attempt to transmit the disease, with ticks collected in Athens, failed; however when they repeated the experiments with ticks from the district of Volo, where the disease is prevalent, they were successful.

Nine experiments were undertaken and 33 subjects were inoculated. All were suffering from G.P.I. or dementia praecox and it was hoped that the resulting fever might have a beneficial action on their mental disability. 373 ticks collected in Athens were employed without a positive result, whereas in one experiment in which only 11 ticks collected in Volo were crushed up and injected a typical attack of the fever was produced in the inoculated man. Batches of ticks from Volo were divided into males and females and successful results were obtained with both emulsions.

D. H.

BLANC (Georges) & CAMINOPÉTROS (J.). Nouvelles recherches expérimentales sur la fièvre boutonneuse (fièvre exanthématique). [**New Researches on Eruptive Fever.**]—*Bull. Acad. Méd.* 1931. June 2. Year 95. 3rd Ser. Vol. 105. No. 21. pp. 884-890. [7 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The authors summarize a series of experimental findings with regard to the presence and persistence of the virus of *fièvre boutonneuse* in the blood of infected persons. They have succeeded on 50 occasions in transmitting the infection from man to man by the intravenous injection of infected blood. (The experiments were carried out during a study of the effect of this mild febrile infection on certain nervous disorders, especially on dementia praecox.) They note that a typical reaction, with the characteristic generalized eruption, is by no means always obtained; but the significance of an atypical febrile reaction is often evidenced by the fact that a further passage results in a typical attack of the disease. These observations lend considerable support to the conclusion, arrived at by other observers on epidemiological grounds, that abortive and atypical attacks—the *formes frustes*—occur under natural conditions.

The blood of a patient suffering from the disease is infective from the onset of the febrile reaction, whether an eruption occurs or not; and remains infective through the whole febrile period. Similar observations have been made on an experimentally infected monkey. The virus is present in the serum, separated from the cellular elements of the blood, and in the leucocytes separated from the plasma. It has also been demonstrated in the cerebrospinal fluid in two cases in which specimens were withdrawn during the eruptive stage. In neither case was there any clinical evidence of meningeal lesions.

W. W. C. Topley.

BLANC (Georges) & CAMINOPÉTROS (J.). Le virus de la fièvre boutonneuse (fièvre exanthématique) provenant du sang de malades ou de l'organisme de la tique est filtrable. [**Filtrability of the Virus of Eruptive Fever.**]—*C. R. Acad. Sci.* 1931. June 8. Vol. 192. No. 23. pp. 1504-1505. [2 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The authors have carried out a series of experiments on the filtrability of the virus of *fièvre boutonneuse*, using as the material for

filtration the serum of infected patients, or saline extracts prepared by grinding specimens of the tick that serves as the vector of infection—*R. sanguineus*. The filtrates were tested by intravenous or subcutaneous inoculation into susceptible human subjects. It is pointed out that one of the great difficulties encountered in these experiments is the slight susceptibility of human subjects to small doses of the virus, and their varying susceptibility to relatively large doses. Several of the experiments yielded entirely negative results, and in others the symptoms which followed inoculation of the filtrates were slight and atypical; but in a few cases a characteristic reaction was obtained, particularly with the filtrates from infected ticks. The candles used in filtration were Chamberland L₄ and L₅.

W. W. C. Topley.

BLANC (Georges) & CAMINOPÉTROS (J.). Le virus de la fièvre bouton-neuse est héréditaire chez la tique *Rhipicephalus sanguineus*. [Transmission of the Virus of Eruptive Fever through the Developmental Stages of *R. sanguineus*.]—*C. R. Acad. Sci.* 1931. June 22. Vol. 192. No. 25. pp. 1682-1684.

It has been demonstrated experimentally that eruptive fever can be carried by the dog tick *R. sanguineus*, but the question of the conservation of the virus apart from man is still unanswered. The authors bring forward epidemiological and experimental evidence to show that the virus is one of the tick and not of domestic animals.

It has been noted in Greece that the disease is most prevalent in the district of Volo; a few cases have occurred in Piraeus but none in Athens or in Crete. Now such animals as dogs, rats, rabbits, etc. are found in these places about equally and ticks are found on all these animals, yet only the Volo ticks proved infective and occasionally ticks from Piraeus; the ticks collected from Athens and Crete were non-infective.

Numerous ticks were collected from Volo and proved to be infective; eggs deposited by some of these ticks in captivity were also shown to be infective; some eggs were allowed to mature and the larvae emerging from these eggs also proved infective. There was definite evidence of multiplication of the virus in the tick.

D. H.

BLANC (Georges) & CAMINOPÉTROS (J.). Recherches expérimentales sur la sensibilité au virus de la fièvre exanthématique des animaux domestiques porteurs de *Rhipicephalus sanguineus*. [Susceptibility of Domestic Animals harbouring *R. sanguineus* to Eruptive Fever.]—*C. R. Acad. Sci.* 1931. July 27. Vol. 193. No. 4. pp. 258-259. [1 ref.]

The authors think that the virus of exanthematous fever, harboured by the dog tick *R. sanguineus*, is passed from adult to larvae. It has been suggested however that some of the domestic animals on which the tick lives might be the hosts of this virus. To test this hypothesis the authors experimented with dogs, rabbits, rats, pigs, sheep and pigeons.

Nine young dogs were injected with blood taken from typical cases of the disease and also with the fluid from an emulsified product of

numerous ticks, but the dogs remained in perfect health. 30 cc. of blood taken from the dogs was injected into human volunteers without result nor did ticks fed on these dogs become infective. Similar negative results resulted with rats, rabbits, sheep and pigeons.

The authors claim that their experiments show that these animals, usually in close contact with man and which normally harbour the tick, are insusceptible to the disease.

D. H.

BLANC (Georges) & CAMINOPÉTROS (J.). De la sensibilité du spermophile (*Citillus citillus*) au virus de la fièvre boutonneuse. [Susceptibility of the Spermophile to Eruptive Fever.]—*C. R. Acad. Sci.* 1931. Aug. 24. Vol. 193. No. 8. pp. 374-375. [1 ref.]

The authors in their search for an animal susceptible to the virus of eruptive fever have shown that the ordinary laboratory animals are insusceptible, as are domestic animals such as the pig, goat, pigeon and sheep; they have now discovered that the white mouse is partially susceptible and that the wild rodent of Macedonia *Citillus citillus*, is extremely so, more so indeed than man, although the animal shows no signs of illness and does not die of the disease. The animal can be readily infected by inoculation of the blood of a case of fever or of the tick *R. sanguineus*. Infection can be readily demonstrated by inoculation from this animal into human volunteers who invariably develop severe attacks of the fever.

D. H.

TROISIER (Jean) & CATTAN (Roger). Fièvre exanthématique inapparente de l'homme provoquée par *Rhipicephalus sanguineus*. Sa virulence pour le singe et le cobaye. [Inapparent Eruptive Fever in Man conveyed by *Rhipicephalus sanguineus*. Effect in Monkey and Guinea-pig.]—*C. R. Acad. Sci.* 1931. July 6. Vol. 193. No. 1. pp. 91-93.

The authors collected 60 ticks from a dog which had never been in contact with any one suffering from eruptive fever. These ticks were crushed up in normal saline, the fluid was filtered and injected into an adult suffering from a nervous disease; the patient showed no fever or other symptom but the Weil-Felix reaction which had been previously tested on several occasions with negative result gave a positive reaction of 1/150 14 days after the injection; five days later it gave a reaction in a dilution of 1/250 and gradually declined to 1/50. 20 cc. of blood taken from the patient during this period was injected into a monkey which on the 11th day developed fever and gave the typical febrile reaction; the monkey also developed a rash on the lips and eyelids. A guinea-pig inoculated with 4 cc. of blood from the patient also ran a typical fever curve and blood was injected into a monkey from this guinea-pig; although the monkey did not develop fever it showed a typical papular rash; one of these papules was excised and examination showed the typical histology of the exanthematous papule.

D. H.

LUTRARIO (A.). Les fièvres exanthématiques en Italie. [**Eruptive Fevers in Italy.**].—*Bull. Office Internat. d' Hyg. Publique.* 1931. Aug. Vol. 23. No. 8. pp. 1403-1410. [4 refs.]

The author has extended his survey of the prevalence of these fevers in Italy and has made enquiries from medical men all over the country. The doctors in Naples are convinced that they do not occur in that city and have not been overlooked.

Professor PREVITERA reports seven cases from Catania which he had diagnosed as mild typhus, in 4 of which the Weil-Felix reaction was positive. Dr. Lutrario says that true typhus is unknown in Italy. By far the greatest number of cases of eruptive fever occur in the suburbs of Rome and have been carefully studied by Dr. SAMPIETRO and others. From the clinical description it is evident that the disease in Italy is similar to that in France; the disease is seasonal (summer) and occurs in the country or suburbs and not in the towns, exactly the reverse of true typhus in other countries, where it occurs in the winter and specially in the crowded slums of cities. As regards the Weil-Felix reaction, SAMPIETRO has obtained a considerable percentage of positive reactions and he considers that if other workers tested the sera late in the fever or in early convalescence and used several different strains of *Proteus vulgaris* X19 they would also obtain positive results. Italian observers, while admitting the close relationship clinically between this disease and Brill's disease, are not yet prepared to say that they are identical but rather that they are varieties of the same disease with slight differences due to the fact that the vector is not the same.

D. H.

CORINALDESI (Silvio). Sulla febbre esantematica mediterranea. [**Mediterranean Eruptive Fever.**].—*Policlinico.* Sez. Prat. 1931. Aug. 24. Vol. 38. No. 34. pp. 1229-1234. [8 refs.] [S. Maria della Scaletta Hosp., Imola.]

Two typical cases are recorded by the author because they were observed in the Province of Emilia (Italy) where such had not been previously reported. The first, however, had spent two days at Marseilles on her way, and the second had shortly before been in Florence and across the Apennines.

H. H. S.

i. NAGAYO (Mataro), MIYAGAWA (Yoneji), MITAMURA (Tokushiro), TAMIYA (Takeo), SATO (Kiyoshi), HAZATO (Hikozaemon) & IMAMURA (Arao). Ueber den Nachweis des Erregers der Tsutsugamushi-Krankheit, der *Rickettsia orientalis*. [**Demonstration of the Agent of Tsutsugamushi Disease, *R. orientalis*.**].—*Japanese Jl. Experim. Med.* 1931. Mar. 20. Vol. 9. No. 2. pp. 87-150. With 18 text figs. & 47 figs. (21 coloured) on 13 plates. [Refs. in footnotes.] [Imperial Inst. for Infectious Diseases, Tokyo.]

ii. —, TAMIYA (Takeo), MITAMURA (Tokushiro) & SATO (Kiyoshi). Sur le virus de la maladie dite tsutsugamushi.—*Bull. Office Internat. d' Hyg. Publique.* 1931. Aug. Vol. 23. No. 8. pp. 1411-1414.

i. In 1915 the authors described bodies staining by Giemsa in the lymph glands and spleen of men suffering from Japanese river fever,

and in 1924 definite diplococcal and short bacillary forms of the same organism stained by Giemsa and Azur II [see this *Bulletin*, Vol. 23, p. 362]. It was then asserted that these organisms were the cause of the disease and belong to the Rickettsia. In 1928 ISHIWARA and OGATA made the important observation that injection of infective material from a case of the disease into the testicle of a rabbit produced a specific local inflammation which could be passed from rabbit to rabbit for many generations (80); in the tissues in such lesions the authors demonstrated small diplococcal and bacillary forms which, however, they were inclined to regard as bacteria. At this date, 1929, the matter was still in doubt; some research workers were of opinion that these bodies were merely granules in the protoplasm of the cells, others thought that they were bacteria and still others that they were Rickettsia and the cause of the disease.

Accordingly, the authors undertook the extensive research which is detailed in this present communication, in the course of which over 1,000 animals, rabbits, monkeys and guineapigs, were utilized. This research was the outcome of the discovery, made by the authors, that the injections of infective material from a case of Japanese river fever, or from an infected animal, into the eyeball of a rabbit produced a specific local inflammation from which the animal in the course of a week or so made a complete recovery. This inflammation, it was found, could be passed from animal to animal by means of infected aqueous humour for many generations. Four strains of the virus were employed, three from human cases subinoculated into monkeys and one strain which had been maintained for several generations in the testicle of rabbits, then inoculated into monkeys and white rats and eventually passed in the eyeball of rabbits. The technique of the injection of the material into the eyeball is described and a careful, clinical description of the local effects in the eye of the rabbit and guineapig follows. The inflammation begins as an iritis with pericorneal injection followed by hyperaemia, oedema and cloudy swelling of the cornea; injection of fluid from such a lesion into the eye of another rabbit invariably produced a similar condition. The incubation period varied slightly but was usually from 7 to 9 days, and the duration of the inflammation was as a rule about two weeks. In rabbits and guineapigs the infection was confined to the inoculated eye and no general symptoms were noted, nor was the other eye affected, but in monkeys although the eye symptoms were similar general infection followed with fever resembling that in man. Whether the infected material used as inoculum was blood from a case of the fever or lymph gland or spleen of an infected rat or monkey, the inflammation produced in the eyeball was invariably the same, and so constant was the success of this method of inoculation in the hands of the authors that they are prepared to say that if a negative result is obtained it is definite evidence of the absence of the virus from the inoculum.

A careful and detailed description of the histo-pathology of the infected eyeball is given; many were removed and examined by section and by stained film; the chief point noted was that in various parts of the eye, such as the aqueous humour, the iris and especially in the endothelial cells of Descemet's membrane enormous numbers of Rickettsia-like bodies were constantly found. The authors are of opinion that these are the cause of the disease and propose for the organism the name of *R. orientalis*. There follows a very careful description of the morphological characters of this Rickettsia which

like other members of the genus is readily stained by Giemsa and is Gram negative, and although it shows a certain amount of Brownian movement has no true motility. The authors have also succeeded in growing this organism in tissue culture, the method of which is fully described; the tissue employed was a portion of the endothelium of Descemet's membrane removed from the normal eye of a rabbit along with normal aqueous humour and a little rabbit plasma; the inoculum was as a rule infected aqueous humour. After a few days incubation enormous numbers of *Rickettsia* appeared in the cultures and the organism has been passed through many generations and 85 days after isolation showed no loss of virulence and produced the typical inflammation in the eye of a rabbit.

Another interesting point noted was that an eye which had recovered from the inflammation was immune to further injections of infective material.

The whole work was carefully controlled and is profusely illustrated by means of coloured plates, charts and tables.

ii. A report to the Office International on the recent important work on Japanese river fever summarized above.

D. H.

OGATA (Norio). Actiologie der Tsutsugamushikrankheit: *Rickettsia tsutsugamushi*. [Aetiology of Tsutsugamushi Disease.]—*Zent. f. Bakt. I. Abt. Orig.* 1931. Oct. 1. Vol. 122. No. 4/5. pp. 249-253. With 2 text figs. [14 refs.] [State Univ. of Med., Chiba, Japan.]

The author gives an historical account of the disease as it has occurred in Japan and elsewhere, and remarks on its limitation to certain districts and areas of the country situated along the course of the great rivers and its seasonal distribution following the floods due to the melting of the snows on the mountains. The vector, as is now well proved, is the larval stage of the mite *Trombicula akamushi* which is practically microscopic in size, thus adding greatly to the difficulties of investigation. Although the great majority of cases are due to the bite of this mite the author has seen cases of direct infection from a previous case and has also observed one fatal case in a laboratory attendant who had pricked his thumb with a needle charged with infective material. For nearly 50 years Japanese investigators have been studying the symptomatology and etiology of the disease and, of recent years, the development of the arthropod vector; yet the actual cause or germ of the disease has up till recently been unknown although various bacteria, protozoa and filtrable viruses have been from time to time incriminated. The animals used in experimental research were first of all Japanese apes, but these are costly and cannot be employed in large numbers, although it has been proved that they are susceptible. Latterly rabbits and guineapigs have been employed, and in 1928 the author introduced his method of intratesticular inoculation in rabbits. Such injection of infected material is followed in a few days by the development of a typical orchitis characterized by swelling and hardness of the gland. The virus can in this manner be passed in series for many generations, emulsion of the testicle being used as inoculum, thus preserving the virus which does not lose in virulence for rabbits or apes. It is obvious that the germ or virus of the disease must be present in the infected testicle, and when sections or smears were made from such an organ *Rickettsia*-like bodies could be demonstrated in large numbers chiefly in the protoplasm of the histiocytes. In control animals (either normal or animals infected with known pathogenic bacteria) no such bodies could be found and bacterial cultures made from the infected testicles proved to be sterile. It has however been possible to keep the virus alive in tissue culture for some weeks without loss of virulence.

In its properties this organism resembles closely other *Rickettsia* bodies such as *R. prowazeki* which is found in lice which have been fed on typhus patients, and *R. rickettsiae* found in the tick which carries Rocky Mountain fever.

The author gives the name *R. tsutsugamushi* to the bodies which he has described in the testicles of rabbits. NAGAYO demonstrated similar bodies in the anterior chamber of the eye in rabbits in 1930 and has called his organism *R. orientalis*, and KAWAMURA who has demonstrated rickettsia bodies in the arthropod carrier has called them *R. akamushi*; it is probable that these are all one and the same, and in that case the name first given should stand.

D. H.

KAWAMURA (R.) & IMAGAWA (Y.). Die Feststellung des Erregers bei der Tsutsugamushikrankheit. [**Confirmation of the Infective Agent in Tsutsugamushi Disease.**—*Zent. f. Bakt.* I. Abt. Orig. 1931. Oct. 1. Vol. 122. No. 4/5. pp. 253-261. With 9 text figs. [7 refs.] [Path. Inst., Faculty of Med., Niigata, Japan.]

The authors have employed the method of Ogata, injection of infected material into the testicle of rabbits, and have confirmed his finding of *Rickettsia* bodies. They have also used the method of Nagayo (inoculation of anterior chamber of eye of rabbit) with like results. They have also injected infective material into the peritoneum of rabbits and guineapigs and have succeeded in clearly demonstrating *Rickettsia* bodies in the endothelial cells of the mesentery. Some excellent microphotographs are reproduced.



Rickettsia akamushi in endothelial cells of Descemet's membrane in a rabbit, following intraocular injection with guineapig's retina. (Ito type; Regaud fixation; Giemsa stain.)

[Reproduced from the *Zentralblatt für Bakteriologie*.]

The authors collected infected field mice from the endemic areas and injected emulsions of the spleen into apes and rabbits; the monkeys developed fever and the rabbits orchitis, and in the cells of the testicles the *Rickettsia* bodies could be readily identified.

Larvae of the Trombiculae were collected from infected field mice

and were fixed and cut in serial section, and in one instance masses of Rickettsia bodies were found in the cells of the salivary glands. The authors suggest the name of *R. akamushi* for this organism; their reasons for considering this parasite to be the cause of the River fever are as follows:

1. These bodies were found in the salivary gland of an akamushi taken from an infected field mouse.
2. They were similar to the bodies found in the testicle of rabbits following an injection with emulsion of the spleen of infected field mice and also in the anterior chamber of the eye of rabbits similarly inoculated.
3. These bodies can be readily distinguished from granules in the cells by reason of their peculiar staining qualities.
4. They are intracellular; and for the most part included in endothelial cells and histiocytes.
5. They can be easily distinguished from ordinary bacteria by staining properties and cultural methods.
6. They cannot be found in control animals.
7. They show similar properties to other known Rickettsia.

D. H.

WOLFF (J. W.). **Observations on the Weil-Felix Reaction in Tsutsugamushi Disease.**—*Jl. Hygiene*. 1931. July. Vol. 31. No. 3. pp. 352–360. With 3 charts. [16 refs.] [Path. Lab., Medan, Sumatra.]

In the Japanese type of tsutsugamushi fever it is generally stated that the Weil-Felix reaction is negative, but the strain employed in Japan is the usual X19 Warsaw type.

In Malaya FLETCHER found that the type of tsutsugamushi fever met with gave a positive Weil-Felix reaction with the Kingsbury type of proteus in a dilution of 1/200 approx. Cases of scrub typhus however gave a positive reaction in a dilution of 1/1000 or higher, and FLETCHER looked upon this difference as one point in the differentiation of these two diseases; practically the only other difference being the absence of a true primary ulcer in the scrub typhus. In the present study 45 cases of tsutsugamushi disease type Schüffner, Dutch Indies, are dealt with. These 45 cases were all typical clinically and all showed the typical primary ulcer and bubo. 30 out of the 45 gave positive reaction with the Kingsbury strain of proteus. Saline emulsions both of the Warsaw and the Kingsbury type were employed; these were killed by 1 per cent. formalin; half of each sample of serum tested was heated for half an hour at 58° C., and both heated and unheated sera were utilized in dilutions up to 1/1000. All the sera, heated or unheated, were negative to the Warsaw strain. As regards the Kingsbury strain 30 of the cases gave strong positive reactions with this type; usually this positive reaction did not appear till near the end of the fever or just after the fever had ceased. In the fifteen cases in which the reaction was negative with both type strains the sera were tested during the fever and for some time after the fever ceased. The majority of the cases gave a reaction up to a 1/1000 dilution. In one interesting case a patient was admitted with tropical typhus and recovered; six months later he was admitted with tsutsugamushi fever with typical primary sore and bubo; the Weil-Felix reaction was positive in the same manner on each occasion.

The fact that it has been shown that the Weil-Felix reaction may be positive in tsutsugamushi fever up to a dilution of 1/1000 leaves

the presence of the primary sore as the only point of difference between this disease and scrub typhus. The author suggests that these diseases are caused by the same virus but carried by a different vector, the one causing a local ulcer and the other not.

D. H.

CARRION'S DISEASE.

BATTISTINI (Telémaco). La verrue péruvienne. (Sa transmission par le phlébotome.) [**Verruga peruana. Transmission by Phlebotomus.**—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1931. July. Vol. 2. No. 7. pp. 719-724.]

The author refers to the work of TOWNSEND (1913-14), who came to the conclusion that the malady of Carrion was conveyed by a blood-sucking insect and incriminated the *Phlebotomus* to which he gave the name *verrucarum*. This work however was not accepted as conclusive by Peruvian observers. Later the Harvard Commission on somewhat slender grounds inclined to the opinion that the disease was conveyed by a tick.

An investigation made by the author and his confrères in 1926 in the absence of an entomologist was inconclusive, but in 1928 the services of Dr. A. N. SAINZ were made available. The experimental animals employed were *Macacus* monkeys which are known to be susceptible to the virus and in whose blood the presence of the parasite is readily demonstrated either by culture or by the microscope.

Flies obtained in the town of Huarochiri, where numerous cases of the disease were occurring, were allowed to bite a monkey and *Bartonella bacilliformis* was recovered in pure culture from the blood and also demonstrated in stained films. [In the single experiment detailed in the paper there is some confusion in the dates as the incubation period appears to be only 2 days.] 220 flies were collected from houses in which cases of Carrion's disease were present and from five batches pure cultures of *Bartonella* were obtained. Also in two experiments in which *Macacus* monkeys were inoculated with emulsions of *Phlebotomus*, 19 in one case, 15 in the other, *Bartonella* was recovered from the blood of the monkeys in pure culture after an incubation period of 14 days.

The flies utilized in these experiments were identified as *P. verrucarum* (Townsend) and two new species classified as *P. noguchii* and *P. peruensis*.

D. Harvey.

JANTZEN (Walther). **Multiple Verruga-like Nodules on the Skin—Case Report.**—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 115-119. With 2 text figs. [Truxillo Railroad Company Hosp., Puerto Castilla, Honduras.]

A similar case to the one described in this paper was observed in this Hospital and a description published by DA ROCHA LIMA in 1925. [See this *Bulletin*, Vol. 23, p. 364.]

A native of Honduras, aged 41, was admitted to the Truxillo Railway Hospital with several skin tumours; he had no systemic illness and

appeared in robust health. The largest tumour was situated on the thigh and resembled closely a verruga lesion ; it was of a red colour and prone to bleed. Other similar but smaller tumours were found on the left forearm and on the face ; the right arm had been amputated in a machete fight. Two of the largest tumours were removed and sent for examination ; the patient then left hospital and was not again seen. The report received was similar as regards the histology to that previously published by Rocha LIMA, but in his case included bodies (Bartonella) were readily found in the cells whereas in the Jantzen case no such bodies could be demonstrated. The tumours consisted in great part of angiomatous tissue, the blood spaces being lined by endothelial cells ; in certain places these cells by proliferation had produced small endotheliomata. The tumours therefore were histologically similar to verruga lesions, but in the absence of systemic symptoms and of the cell inclusions it was not possible to make any definite diagnosis. The further history of the case would be of interest.

D. H.

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- i. MACKEHENIE (Daniel). L'érythropoïèse dans l'anémie grave de la maladie de Carrion (verrue péruvienne).—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1930. June. Vol. 1. No. 6. pp. 563-569.
 - ii. MONGE (Carlos) & WEISS (Pedro). A propos de l'hématologie de la maladie de Carrion ou verrue péruvienne.—*Ibid.* pp. 570-574. With 5 coloured plates.

HELMINTHIASIS.

HEYDON (G. M.) & GREEN (A. K.). **Some Worm Infestations of Man in Australia.**—*Med. Jl. Australia*. 1931. May 23. 18th Year. Vol. 1. No. 21. pp. 619-628. With 1 text fig. [20 refs.]

Trichostrongylus. Eggs corresponding to *trichostrongylus* were noted on the Atherton tableland in human faeces. These, free from earth, were despatched to Townsville in tins and at the time of their examination were commonly a week old. They were then cultured and the infective larvae thus obtained from man were fed to four kids about a fortnight old. Four controls from the same litters remained free from infection to D.C.F. and to "the much more delicate method of culture of large samples for larvae," nor were adults found in those of them who were killed after 5 weeks, and examined. From the experimental kids there were obtained in all 62 *Haemonchus contortus*, about 2,300 *trichostrongyles*, of which about 1,200 were male *T. colubriformis* and nine were male *T. extenuatus*. One *Trichuris ovis* was also found. It was judged that reinfection of kids from their own faeces could be excluded owing to the dry state of the yards and that, though all possibility of naturally acquired infection could not be entirely excluded, these uncertainties were small since none of the controls became infected. [It should be noted however that unquestioned acceptance implies the presence of *Haemonchus contortus* and of *Trichuris ovis* in man.] *Trichostrongylus* eggs were found by Willis's technique in 24 of 6,983 persons from the Atherton tableland, in 3 of 5,263 persons from the Babinda-Gordonvale district, and in one from Atherton town who had previously lived near Babinda. Of dried infective larvae kept in a dark cupboard during winter, 75 per cent. recovered after 52 days and lived in water for many days, while of dried larvae kept between 1° C. and 6° C. many survived 116 days. "In earth or coiled in masses on herbage they can survive for still longer periods in the dry state" Sunlight however kills them readily even when the temperature is kept below 20° C. Efforts to make them enter the skin of young rats by Goodey's method failed, nor was application of larvae to the skin of man followed by any irritation or appearance of eggs in faeces, so that at least the common method of infection is by mouth; and although swallowing of larvae in water or dust is possible the most common means is believed to lie in the Nebuchadnezzar-like habit of chewing grass, a habit noted in one of the infected children. No symptoms were found referable to infection. Cure as judged by Willis's technique was obtained by 1, 2, or 3 treatments with oil of chenopodium 0.18 mls for each year of age.

Strongyloides stercoralis. In these week-old stools *S. stercoralis* was found to Willis's technique 7 times in [apparently about 800] aborigines and 7 times in 23,000 non-aborigines, it being held apparently that floatation displays them satisfactorily. A rhabditis is described.

Larval cultures. In these week-old stools larval culture is held most satisfactory. A 20 gm. sample is disintegrated in a large amount of water, the suspension sedimented and the sediment poured on to the surface of a quantity of dry earth in a tin. Most of the eggs are held to be filtered out on the surface which should then be broken up, and the top inch extracted after 5 or 6 days. "The hookworm larvae which in a culture such as has been described climb the sides of the

tin are but a small minority." [The tins were however untrapped and no evidence is offered for this statement.] Under the heading of orientation of the thermo-tropic larvae is the following :—

"The larvae are placed on a slide in a small drop of water and a large drop of thick agar at a temperature below 45° C. is allowed to fall on them; a cover glass is applied immediately. When the agar has set, a hot glass rod is brought close to the upper surface of the cover glass; many of the larvae will be seen to congregate at a point immediately beneath the rod, trying to bore through the cover glass; the hot rod is then lowered into light contact with the cover glass for an instant and then removed.

"If the preparation is then placed under the microscope, a number of the larvae are found to have been killed in such a position that a good end-on view is obtained; they are held in this position by the agar. As the anterior extremities are immediately beneath the cover glass, oil immersion lenses of short working distance may be used."

Clayton Lane.

NAZMI (M.). **The Microscopical Diagnosis of Helminth Infection in Egypt.**—*Jl. Egyptian Med. Assoc.* 1931. July. Vol. 14. No. 7. pp. 412-418.

"Inasmuch as a practitioner hardly ever fails to apply his stethoscope to the patient's chest . . . the examination of his urine and faeces ought to be just as important, although less impressive, than the world-wise attitude the doctor assumes with the earpieces in place and silence enjoined." Dependable directions are given for the examination of urine (particularly the complete need for determining whether schistosome ova are alive before antimony is given) and for the stool examination for the ova of blood flukes. For other helminthic ova in faeces the Willis method is advised, or Khalil's, of which latter it is said "Thus all the ova contained in the original 2 cc. of stools will have been concentrated in an area of about 1 cm. in diameter in a medium free from at least the grosser particles of faecal debris." [Those who advise this technique have elected to ignore persistently the abstractor's findings, not denied hitherto, that gravity floatation in an inverted funnel delivered on the average one-fiftieth of the eggs present in the faeces used.]

C. L.

- i. KOSTYLEFF (N. N.) & BLOHINA (Z. A.). Ueber die Verbreitung des Helminthenträgertums zwischen Landeinwohnern des Nowgorodschen Bezirks. [**Incidence of Helminths among the Rural Population of the Novgorod District.**]—*Milit.-Med. Ztschr.* Leningrad. 1930. Vol. 1. No. 3-4. pp. 45-53. With 5 text figs. [4 refs.] [In Russian.]
- ii. KUSCHELEFF (W.). Zur Frage ueber den Einfluss des Helminthenträgertums auf allgemeinen Gesundheitszustand der Rotarmisten. [**Influence of Latent Helminthic Infections upon the Health of Red Army Soldiers.**]—*Ibid.* pp. 54-66. [21 refs.] [In Russian. German summary p. 67.]
- iii. SAWITZKY (N. N.). Zur Methodologie der Bandwürmervertreibung. [**Method of Expulsion of Tape Worms.**]—*Ibid.* pp. 68-69. [In Russian.]

i. The authors report the results of a helminthological examination of the population of a number of villages in the Novgorod district

(North-Western Russia). The examination was undertaken with the object of establishing the incidence of helminths in a typical rural population, and forms part of a scheme for a general helminthological survey throughout Russia. The total number of local peasants examined was 668, besides 32 temporary inhabitants considered separately. A modification of Fülleborn's method was employed: both the surface film, produced after mixing the faeces with a saturated solution of sodium chloride, and the deposit were examined. Apart from this 1-2 faeces-smears were examined in each case, while for the detection of *Oxyuris* eggs anal scrapings were made. It was found that 403, or about 60.3 per cent., of the peasants were infected. The incidence amongst the non-resident population was 40.5 per cent. The worms were distributed as follows in the two categories of population: *Ascaris lumbricoides* (362+7), *Trichuris trichiura* (12+4), *Enterobius vermicularis* (62+2), *Trichostrongylus* sp. (2+0), *Diphyllobothrium latum* (2+0), *Taenia solium* (4+0), *Hymenolepis diminuta* (2+0). There were 38 cases of mixed infections.

ii. The author has examined soldiers of the Red Army attending the clinic of the Military Academy of Medicine with the view to establishing the influence of latent helminthic infections upon their general health. Out of 100 soldiers 29 per cent. were found to be "carriers" of helminths, in the following proportions: *Trichuris* 17 per cent., *Ascaris* 13 per cent., *Taenia solium* 2 per cent., *Diphyllobothrium* 1 per cent., *Enterobius* 1 per cent. The incidence in peasants (39 per cent.) was higher than in town-dwellers (23 per cent.), while the distribution of the various forms also differed in the two groups: amongst the peasants 58 per cent. harboured *Ascaris*, 33 *Trichuris* and 25 other helminths, whilst amongst the town-dwellers 88 per cent. were infected with *Trichocephalus* and 12 per cent. with *Ascaris*. No special symptoms attributable to the helminths could be detected in the "carriers." All the soldiers examined were divided into three groups: 70 uninfected, 17 *Trichuris*-carriers, and 13 *Ascaris*-carriers. These were subjected to a thorough physical and clinical examination, according to Nadeshdin's standard method (*Deutsch. Zeitschr. ges. gerichtl. Medizin.* 1928, Vol. XI, p. 401).

The average constitutional and functional conditions were recorded for each group and compared, and observations were made on the activity of the lungs and the condition of the nervous system. It is concluded that while no specific symptoms could be attributed to the helminths, they have a certain effect upon the general well-being of the subject and upon the nervous system.

iii. The author describes a method of expulsion of tape-worms using Einhorn's duodenal catheter. The patient is given 30 gm. sodium sulphate in the afternoon and starved for the rest of the day. Next morning the bowels are emptied by an enema. The patient is allowed to swallow the catheter and placed on the right side. The penetration of the catheter into the duodenum takes place in about 1-2 hours, being indicated by the flow of an alkaline yellow fluid from the free end. The patient is then turned on to the back, a small glass funnel is attached to the end of the catheter and the following emulsion is poured into it: ethereal extract of male fern 5.0 gm., gum arabic mucilage 5.0 gm., sodium carbonate 0.5 gm., distilled water 50.0 cc. About 3/5-4/5 of this amount, equivalent to 3-4 gm. of male fern, is usually introduced. Immediately afterwards 50 cc. of warm 50 per cent. solution of sodium sulphate is poured in and the catheter extracted.

Expulsion takes place in about 1-2 hours. This method is said to be superior to all others in that all the toxic effects of the drug are avoided and the desirable effect is produced by half the usual dose.

C. A. Hoare.

TROFIMOWA (A.). Helminthokoprologische Untersuchung der Schüler ASSR der Wolgadeutschen. [**Helminth Investigations of Schools of Volga Germans.**].—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 1. pp. 109-112. [In Russian. German summary p. 113.]

The German abstract shows that in two Russian schools the percentage of infected children varied from 26.4 to 56 and in three German ones from 9 to 24. The method of examination is unstated but enterobius averaged 16.6 per cent., trichuris 3.9 and ascaris 1.9. The tables in the Russian text show that trichostrongylus eggs were found in four of 325 Russian children and in none of 239 German children.

C. L.

SILPANOW (N.). La faune helminthique des indigènes du Tourkménistane. [**Helminthic Fauna of the Natives of Turkmenistan.**].—*Arch. Sci. Biol.* 1931. Vol. 31. No. 1. pp. 9-14. [6 refs.] [In Russian. French summary pp. 15-16.] [Chem. Bact. Inst., Turkmenistan.]

By a technique unstated in the summary the native inhabitants of Turkestan were found infected to the following percentage extent: *Hymenolepis nana* 8.4, *Trichuris trichiura* 8.4, *Taenia solium* 7.8, ascaris 6.5, enterobius 3.2, *Fasciola hepatica* 2.5, *Diphyllobothrium latum* 1.7, "*Distomum lanceoliforme*" [*Dicrocoelium dendriticum*] 0.5, ankylostomes 1.19. Russians are less infected, as are the dwellers in Tadzhikistan; "ouzbeks" are more so.

C. L.

NEULAND-DOBROWA (M.). Arbeit der I. (86. Unionexpedition) Helminthologischen Expedition des Staatsinstituts für Mikrobiologie und Epidemiologie des Süd-Ostens RSFSR im Stalingrad'schen Bezirk. [**Helminth Investigation near Stalingrad.**].—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 4. pp. 589-604. [In Russian. German summary.]

The parasites reported as present in scholars were: trichuris, enterobius, ascaris, trichostrongylus, *H. nana*, *D. latum*, taenia, *Dicrocoelium dendriticum* and *Fasciola hepatica*. The highest percentage of infection among grown persons, found by an unstated diagnostic method, was 56 in Erdgräber [? diggers]; among children it was 58 for Armenians and 54 for Tartars. The last harboured *H. nana* to 44 per cent., the highest percentage shown in the investigations. A sanitary campaign is advocated. 342 animals were examined also.

C. L.

ISHII (N.) & TET TOK WA. **Studies on the Frequency of Parasites and their Connection with Vegetables in Amoy, China.**—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1931. Aug. Vol. 30. No. 8 (317). [In Japanese. English summary pp. 61-62.] [Japanese Hosp., Amoy, China.]

Of 634 persons whose faeces were examined, presumably by smear, in Amoy, 423 or 66.72 per cent. were infected. Individual infection numbers were as follows: "Amoeba" 208, ascaris 160, trichuris 94, hookworm 17, enterobius 6, *T. saginata* 1, clonorchis 6.

C. L.

KELLER (A. E.). **Field Studies of Human Intestinal Parasites in Tennessee.**—*Southern Med. Jl.* 1931. Apr. Vol. 24. No. 4. pp. 336–343. With 3 figs. & 1 graph. [10 refs.] [State Dept. of Public Health, & Dept. of Preventive Med. & Public Health, Vanderbilt Univ., Nashville, Tenn.]

Examinations were made on 25,192 persons living in rural areas "almost entirely unsanitated" and representing 2.1 per cent. of the rural population. The technique was that of Stoll and Hausheer. "By using this technique it has been possible to determine not only the incidence but also the intensity of the worm burden of the persons infected with the different helminths" [which implies for hookworms that by examining one two-hundredth of a gram the presence of a worm can be substantiated which lays about 40 eggs per gram of faeces]. Hookworm incidence by this method measured 7.4 per cent. as compared with 25.4 per cent. found by the Rockefeller Sanitary Commission in the same area about 20 years earlier by the use of the smear. It is held that the smear is probably less accurate than the Stoll Hausheer technique. For ascaris the percentage of infection found was 26.3 as against 21.3 by the Rockefeller Sanitary Commission, and for trichuris 7.8 as against 4.7, and for *Hymenolepis nana* 2.9 against 2.4. Seven cases of *H. diminuta* infestation have been found, while the eggs of *Enterobius vermicularis* were detected in 0.25 per cent. "The failure to find its eggs more frequently is undoubtedly because its habitat is usually the lower colon and the eggs, therefore, are not uniformly distributed in the stool specimens" [an explanation which scarcely fits the facts].

C. L.

BARLOW (C. H.). **A New Method for examining Urine for Helminth Eggs.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 212–217. With 2 figs.

The method aims at enumeration of helminthic eggs in urine and the preservation by drying of the centrifugal deposit. The details, which have been followed with some difficulty, are fully set out. The aim is to obtain the whole morning urine, mix it, precipitate a known fraction, add to the precipitate a drop of aqueous solution of methylene blue, and spread the blued precipitate evenly and not too densely, within a grease proof pencilled enclosure on one or more slides. It may be examined at once, or dried and stored till needed. If the latter it may readily be transported, and before examination enough water is added to moisten it all without forming a meniscus. Drying is reported to roll *S. mansoni* eggs so that the spine becomes visible. Moistening may be repeated for a series of examinations at different times, eggs and cells filling out each time.

C. L.

ZSCHUCKE (Johannes). Eine Kammer für die mikroskopische Zählung von Helmintheneiern und -larven. [**A Chamber for the Microscopical Enumeration of Helminth Eggs and Larvae.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. June. Vol. 35. No. 6. pp. 357–363. With 1 text fig. [18 refs.]

The author describes a shallow cell measuring 25 by 15 and 2 mm. deep, its bottom marked by fine lines into squares 0.5 mm. wide,

and by heavy lines into others 5 mm. wide, each that is enclosing 100 of the smaller squares. He has found that this aid to accuracy increased his Stoll counts as 33.3 is to 24.3.

C. L.

GUILLINY (R.). Détermination du temps optimum dans la recherche des oeufs de parasites intestinaux par la méthode de la solution saline. [**The Best Time to examine for Helminthic Ova by the Floation Method.**]—*Marseille-Méd.* 1931. Feb. 25. Vol. 68. No. 6. pp. 289-293. [1 ref.]

Guilliny has tested a modified Willis's technique for that duration of gravity floatation, in a saturated solution of salt, which gives the best results. He reaches the following comparative figures, thus confirming results already published :

	10 mins.	30 mins.	1 hour	3 hours	6 hours	14 hours
Ascaris ...	23	45	96	42	10	8
Trichuris ...	51	103	130	105	78	22
Ankylostome...	36	87	111	47	41	2

He compared his method against the smear in the same group of persons and found that the two techniques showed the following differing percentages of infection :

	Percentage after enrichment	Percentage after direct examination
Ankylostomes	100	73
Ascaris	77	72
Trichuris	86	47
<i>Schistosoma mansoni</i>	4.5	28
Enterobius... ..	3	1

[It will however be realized that the latter method of comparison will give figures varying with each varying weight of infection, seeing that in a series of heavy enough infections a smear will detect 100 per cent. of them, whereas in a series of light enough infections a smear will detect none.]

C. L.

BLASCHIN (A. N.). Beobachtungen der Eier von Parasitenwürmern auf einem dunkeln oder kontrastierenden Grund. [**Observations of Ova of Parasitic Worms on a Dark or Contrasting Ground.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. June. Vol. 35. No. 6. pp. 363-365. With 1 text fig. [Trop. Inst., Abkhasia, Georgia.]

The "Kofoid-Barber-Fülleborn" method for the detection of certain nematode eggs in faeces is evidently held to be the method of election in nearly all laboratories. Blaschin has not found it satisfactory because it does not collect all eggs. He advises that faeces

should be ground up with a wooden instrument in a flat-bottom glass cylinder with 20 times its volume of saturated salt solution, filled brimful with the same or with some glycerine, covered without inclusion of an air bubble, and examined. The cylinder, 45 mm. high and 20 mm. wide, is then placed on the microscope stage and viewed from above being lighted by a horizontal ray of light striking it at the surface level or just below this. No instructions are given as to allowing the vessel to stand for gravity to have its slow effect in floating eggs. It is apparently held that eggs float throughout the stages of embryonal development, since the method is advised as a means of watching this. It is advised also as a method of egg counting, though no control as to its efficacy is mentioned.

C. L.

MANDOUL (A. H.). A propos de l'action de quelques helminthes sur l'évolution de la tuberculose. [**Action of Helminths on the Development of Tuberculosis.**]—*Ann. Parasit. Humaine et Comparée*. 1931. July 1. Vol. 9. No. 4. pp. 323-324. [5 refs.] [Parasit. Lab., Faculty of Med., Bordeaux.]

In connexion with SOROUR's paper (this *Bulletin*, Vol. 28, p. 190) suggesting that bilharziasis is inimical to tuberculosis by reason of the induced eosinophilia, Mandoul draws attention to work by JAMMIS and himself (1904 to 1906) indicating that guineapigs treated with extract of taenia were resistant to tubercle. He states too that ankylostomiasis is inimical to tubercle infection and produces an intense eosinophilia. [The last statement cannot surely be upheld.]

C. L.

WALRAVENS (P.) & LOMBART (H.). Verminose urinaire. [**Urinary Verminosis.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. June 31. Vol. 11. No. 2. pp. 205-207. With 1 text fig. [Bact. Lab., Elisabethville.]

From clot obtained by centrifuging the urine of a European suffering from sharp lumbar pain the authors isolated about 20 spindle-shaped bodies 91μ long by 31μ broad with transversely striated shell and containing debris but no sign of an embryo; and also a sheathed larvae 460μ long. It is suggested that, if these objects are eggs of *Diocotophyme renale*, their unusual shape might be explained by their having no embryo, though it is pointed out that the body described as an embryo is bigger than that of this parasite. Ten more examinations failed to discover the spindle bodies again, though an incomplete "larva" was found once. Precautions taken to prevent contamination of the vessel receiving urine are not mentioned. The urine continued to display red corpuscles and leucocytes.

C. L.

ZEITSCHRIFT FÜR FLEISCH- UND MILCHHYGIENE. 1931. Aug. 15. Vol. 41. No. 22. pp 487-488. With 1 text fig.—Zum Auftreten der chinesischen Wollhandkrabbe in Deutschland. [**Occurrence of Chinese Crab, Eriocheir, in Germany.**]

The crab *Eriocheir sinensis* was first found in the lower Elbe about 8 years ago. How it came from the Far East is unknown, but it has thriven and spread to a distance of 40 km. south of the port.

C. L.

GARIN (C. N.), ROUSSET (J.) & GONTHIER (B.). Un nouvel anthelminthique: le tétrachloréthylène. [**Tetrachlorethylene, a New Anthelmintic.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. June 15. Year 47. 3rd Ser. No. 20. pp. 1003-1005.

The authors have given 371 treatments in doses which, to persons not notably weak, were mostly of 3 gm. on the first day, 4 on the second and 5 on the third, given 1 gm. at a time in capsule at hourly intervals, patients being confined to bed or at least to their rooms, alcohol being forbidden and milk encouraged, and urine being tested daily. Three hours after the last capsule, a dose of 40 gm. of sulphate of soda was given. All stools were washed for worms, and it is stated that there was "numération" of eggs, by which is apparently meant examination of the stools presumably by smear a month after treatment. By these tests 91·5 per cent. of hookworm carriers were disinfested, 77·4 per cent. in one treatment. There were also expelled *Taenia saginata* in 2 cases, ascaris in 13, and trichuris in 36. No estimate of the numbers of cases originally infected with these additional worm species is attempted. The urine was tested daily 3 or 4 hours after ingestion of the drug. No albumin was found, but an orange red colour showed up with nitric acid. No ill effects were encountered beyond a feeling of drunkenness and giddiness immediately after taking the drug. [KENNEDY'S quite anxious experience after 3 gm. will not be forgotten, this *Bulletin*, Vol. 27, p. 420.]

C. L.

HACK (Philip). **A Case of Delayed Toxic Reaction following Antimony Therapy.**—*Jl. Med. Assoc. South Africa.* 1931. Jan. 10. Vol. 5. No. 1. p. 22.

For urinary bilharziasis tartar emetic to grains xx (gm. 1·3) was given between 18th July and 3rd August to a European boy of 15. On 22nd August he became pyrexial with cough, right hypochondriac tenderness and resistance, epistaxis, delirium, the temperature reaching 106° F., a sallow complexion, impaired air entry at right base, and albuminuria. The symptoms cleared up after an injection of sodium nucleate. It is particularly pointed out that this reaction occurred after the use of the potassium salt.

C. L.

AKIL-MOUKTAR. Le tétrachlorure de carbone, remède efficace contre les oxyures et les taenias. [**Carbon Tetrachloride in the Treatment of Oxyuriasis and Taeniasis.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. Feb. 9. Year 47. 3rd Ser. No. 4. pp. 183-184.

The adult dosage was 3 to 4 cc. It is advised for thread worms on unstated grounds, was found poor for ascaris, and is said to have been completely successful in 28 of 30 cases of *Taenia saginata*.

C. L.

POUCHET. Utilisation des pyréthrinés en médecine humaine, vétérinaire et en hygiène. [**Employment of Pyrethrum in Animal and Human Medicine.**]—*Bull. Acad. Méd.* 1931. July 7. 95th Year. 3rd Ser. Vol. 106. No. 26. pp. 14-16.

In effect the claim is to the discovery of the perfect parasiticide in the active principles of *Chrysanthemum cinerariaefolium*, completely non-toxic and non-irritant to the host, while ascaris, trichuris, hookworms, thread worms and tape worms are eliminated by treatment on one, or perhaps on several days. Kennels, farms and stud farms can be cleared of parasites

or, as a second thought seems to suggest, at least almost cleared. An archaeological expedition on the Euphrates was kept clear of trichuris by monthly dosage. The dose one horse got was 2 gm. of pyrethrine in the oil which the plant apparently gives. Intratracheal injections are advised for the verminous bronchitis of cattle. Fleas, lice, ticks and bugs cannot stand a dilution of 1 in 200,000, while any dwelling or ship is cleared of insect vermin by a spray of one in a quarter of a million. Is it cruel to ask for a scrap of controlled evidence?

C. L.

KOCHMANN (M.). Chlorcarvacrol als Anthelmenticum (Carvasept) (nebst Bemerkungen über die Wirkung des Carvacrol, Thymol und Santonin). [**Chlorcarvacrol as Anthelmintic.**]—*Arch. f. Experim. Path. u. Pharmacol.* 1931. Aug. 1. Vol. 161. No. 2. pp. 196-205. With 3 text figs. [8 refs.] [Pharmacol. Inst., Combined Univ., Halle-Wittenberg.]

Chlorcarvacrol is one of the thymol series and indeed has a thymol-like smell. It is a crystalline body, soluble in about 5,000 parts of water, readily soluble in oil and in alcohol, even diluted alcohol. Its effect on earthworms has been tested; the uncut worm is paralysed in a dilution of 1 in 150,000, killed in a more concentrated solution; strips of worm show rhythmic contraction, spasm or paralysis according to the strength of the drug. The leech required greater concentrations to obtain the same effect. Given to dogs in oily solution it removed tapeworms in one or in two doses of 0.1 gm. each, apparently 0.03 to 0.04 gm. was held an equally effective dose, while ten times that dose had no ill effect on medium sized dogs. The toxicity of chlorcarvacrol is less than that of carvacrol, and to certain animals than thymol. To earthworms it is more lethal than santonin.

C. L.

ADVIER. Sur plusieurs cas d'helminthiase résistante à la thérapeutique. [**Cases of Helminthiasis Refractory to Treatment.**]—*Marseille Méd.* 1931. Feb. 25. Vol. 68. No. 6. pp. 283-287.

Six cases are described in which helminthic infections continued to be detected after vigorous treatment. 1. Hookworm, trichuris, *S. mansoni*, *H. nana*, treated with thymol, male fern, pelleterine, emetine. 2. Hookworm, trichuris, *S. mansoni* treated with thymol and emetine. 3. The same three worms and also ascaris treated with santonin, thymol, and emetine. 4. The same three worms treated with thymol and emetine. 5. *S. haematobium* treated with emetine. 6. Vesical and intestinal schistosomiasis treated with emetine. In discussion JOYEUX pointed out that the question of possible reinfection remained unanswered.

C. L.

KEMP (Alexander H.). **Intestinal Parasites: a Suggestion in the Method of Treatment.**—*Jl. Amer. Med. Assoc.* 1931. June 6. Vol. 96. No. 23. pp. 1948-1949.

It is suggested, evidently as a new idea, that the preanthelmintic purge may be omitted without risk to the host and without protection to the worm. Some instances are given in which worms were passed when the drug was given without preparation of the patient. In 3,000 cases so treated there were none of the ill effects which seem to have been expected.

C. L.

MEIDINGER (F. E.). La bilharziose dans la région de Bou-Denib. [**Schistosomiasis in the Region of Bou-Denib, East Morocco.**]—*Arch. Méd. et Pharm. Milit.* 1931. Mar. Vol. 94. No. 3. pp. 427-462. With 3 text figs. & 3 maps (1 folding). [1 ref.]

The discovery of this new focus of endemicity for vesical schistosomiasis in Morocco is the occasion for a general paper in which a map of the eastern hemisphere shows *S. haematobium* as affecting among other places the whole of Spain and Portugal, the whole of Australia and the whole of the peninsular portion of India. In Bou-Denib 35 per cent. of persons are held to be infected and 80 per cent. of some military units. Treatment with emetine was found useless, that with tartar emetic and fouadin to give good results but to be followed by relapse.

C. L.

BOUSQUET (Alcide). La bilharziose dans le Nefzaoua. Etude sommaire. [**Schistosomiasis in the Nefzaoua.**]—*Arch. Inst. Pasteur de Tunis.* 1930. Dec. Vol. 19. No. 4. pp. 438-450. With 5 text figs. & 1 map. [9 refs.]

An essential factor in the local epidemiology is the number of springs, one village of 109 inhabitants being surrounded by seven. At the same time the distribution of "pisseurs de sang" is most irregular. The snail implicated is *Bullinus contortus*—*B. dybowskii* and planorbis not being found. *S. haematobium* alone is present with an occasional intestinal habitat. Of specific remedies Bousquet prefers emetine to tartar emetic, antimosan or fouadin; but for ambulatory causes methylene blue. Moreover the people, it is noted, actually come back and ask for more of this last. Of prophylactic measures against snails, chemical ones are held dangerous, and mechanical ones advised; though the complete and periodic drying up of irrigation channels may, it is realized, be very difficult to secure.

C. L.

GOPSILL (W. L.). **Schistosomiasis in Nyasaland, and its Treatment by Means of Fouadin.**—*Jl. Med. Assoc. South Africa.* 1931. Apr. 11. Vol. 5. No. 7. pp. 222-223.

This paper deals with the routine examination of the urine of 500 and of the faeces, presumably by smear, of 1,000 persons. Of the urines 80 per cent. showed eggs of *S. haematobium* and none those of *S. mansoni*, while none of the infected persons complained of any symptoms except ten with vesical calculi. Of the faeces "30 per cent. were positive to ankylostomiasis and *Schistosoma mansoni*" and all with the latter infection gave a history of a dysenteric stage. Details of treatment are not easy to follow, but apparently cure was more rapid with six intramuscular fouadin injections, on alternate days rising from 1 cc. to 4 cc., than with tartar emetic or emetine. "Routine examination of the faeces of forty different pigs showed a positive result to the ova of *Schistosoma mansoni* in 32 cases."

C. L.

STAUDT (H.). La schistosomiase à l'école professionnelle de la Kafubu (Katanga). [**Schistosomiasis at a School in the Katanga Province.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Mar. 31. Vol. 11. No. 1. pp. 67-73.

Of 175 [not 171 as stated once in the text] school children, between the ages of 10 and 16, examined for schistosome eggs, the eggs of *S. haematobium* were found in the urine in 51 (29.14 per cent.), two showing also the eggs of *S. mansoni*, while 16 (9.14 per cent.) showed the eggs of the latter in the faeces. The general health of the infected was held to be excellent and symptoms to be less severe than in Egypt; albumin was a valuable sign of infection; macroscopic evidence of blood was present in 10. In treatment, stibanyl and neostibosan appeared useless, antimosan gave good results in the case in which it was tried, stibyl was effective, but produced ready vomiting, tartar emetic by mouth in doses which could be tolerated had no effect in 24 days though intravenously the potassium salt was effective, emetine was expensive and proved less effective than tartar emetic. A mixed treatment of three injections of each was excellent, 4, 6 and 8 cgm. of emetine followed by 6, 8 and 8 cgm. of tartar emetic.

C. L.

CAWSTON (F. G.). **Pathological Conditions associated with Schistosomiasis in South Africa.**—*Jl. Trop. Med. & Hyg.* 1931. Feb. 16. Vol. 34. No. 4. pp. 55-57. [7 refs.]

"The hepatic changes caused by the development of schistosomes before they migrate into the mesenteric veins must receive due consideration in any efforts to cure bilharzia disease.

"Chronic appendicitis due to bilharzia ova draws attention to the need for a more careful examination of the urine and for the detection of other parasites which might complicate surgical interference. Operation or treatment of bacterial conditions must not be attempted without the destruction of these large blood parasites, where they are shown to exist.

"Every endeavour should be made to ascertain the amount of bilharzia infection amongst South African stock and to prevent human beings from being exposed to possible attack.

"The attempt to obtain a too rapid cure of bilharzia disease is likely to result in the formation of septic foci by the sudden removal of these blood-flukes from their usual situation in the abdominal veins."

C. L.

HASHIM (M.). **Pathological Lesions of the Gall-Bladder, associated with Ulcerations and Bilharziasis of the Intestine.**—*Jl. Egyptian Med. Assoc.* 1931. Sept. Vol. 14. No. 9. pp. 461-472. With 7 text figs.

Of 280 autopsies performed at Kasr el Aini Hospital during the last two years, 43 showed intestinal lesions due to schistosomes, and six of the 43 showed bilharzial lesions of the gall bladder, infection having been proved during life by finding ova in faeces or urine or both. Only two persons made definite complaint of pain in the gall bladder region; one proved to have also an amoebic abscess of the liver, the other died of acute cholecystitis and hepatic atrophy. All six showed ova of *S. mansoni*, two also those of *S. haematobium*, and

in all six cases the lesions comprised all the coats of the viscus. It may be added that of the 280 cases, 12 were of amoebic dysentery, 4 having also hepatic abscess and one an amoebic infection of the mucosa of the gall bladder.

C. L.

ASSALI (J.). A propos d'un cas de tumeur bilharzienne. [**A Schistosomal Tumour.**]—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 499–501. [Central Native Hosp., Dakar.]

A left scrotal tumour of three years' duration, reaching to mid-thigh, consisted partly of hernia, partly of solid matter apart from the testis, and partly evidently of bladder since, by squeezing it after micturition was finished, more urine could be passed. The skin was ridged with veins as wide as the little finger. A difficult bloody operation removed tumour with testis and opened the bladder which was sewn up, but subsequent leakage of urine through a fistula ceased only on tying a catheter into the urethra. The tumour weighed 1 kgm. and consisted of an aggregation of lumps varying from the size of a billiard ball to that of a mandarine orange. It creaked on cutting and consisted of concentric fibrous tissue round calcified schistosome eggs with terminal spines.

C. L.

STEWART (Quintin). **A Bilharzial Tumour of the Appendix.**—*West African Med. Jl.* Lagos. 1930. July. Vol. 4. No. 1. p. 3. With 3 figs. on 2 plates. [4 refs.]

The appendix, removed at herniotomy, was 3 cm. in diameter distally, tapering to close to its base; on section it was hard, white, homogeneous, with schistosome ova throughout it and giant cells. In sections the eggs appeared to be terminal spined.

C. L.

CAWSTON (F. G.). **A Case of Bilharzia Disease complicated by Jaundice.**—*Jl. Trop. Med. & Hyg.* 1931. Oct. 1. Vol. 34. No. 19. p. 317. [3 refs.]

In spite of marked jaundice, a girl of 18 with ova of *S. haematobium* in bile-stained urine was given intramuscularly during three weeks 18½ cc. of foudadin in usual doses of 2½ cc., the first two doses having been of 1 cc. and 2 cc. At the end of treatment degenerating ova had completely disappeared, and in the next few weeks she gained 20 lbs. GOPSILL is reported as advising half the recommended doses, as being safe and more efficacious than full ones.

C. L.

HASSAN (Aly). **A Comparison of the Relative Killing Power of Some Colloidal Metals on the Schistosome Cercariae of the Human Type.**—*Jl. Egyptian Med. Assoc.* 1931. Aug. Vol. 14. No. 8. pp. 405–414.

Fresh schistosome cercariae were killed in one hour by colloidal metals in the following dilutions: calcium 100,000, gold 80,000, antimony 40,000, arsenic 20,000, copper and iodine 8,000, bismuth, iron, silver, manganese and mercury 4,000. Calcium chloride needs a strength of 1 in 20.

C. L.

GIRGES (Rameses). **Pathology of Schistosomiasis Haematobium.**—*Jl. Trop. Med. & Hyg.* 1931. Mar. 2. Vol. 34. No. 5. pp. 65-75. With 6 text figs. [4 refs.]

A general review of the conditions found.

C. L.

MATTEI (R. Marina). Su alcuni casi di Schistosomiasi vescicale. [**Urinary Schistosomiasis.**]—*Ann. di Med. Nav. e Colon.* 1931. July-Aug. Year 37. Vol. 2. No. 1-2. pp. 395-407. With 1 text fig. [5 refs.]

The author describes 4 cases of infestation by *S. haematobium* in the district of Scebeli, Italian Somaliland.

H. H. S.

ARCHIBALD (R. G.) & MARSHALL (A.). **A Study of Three Non-Furcocercous Cercariae obtained from *Bullinus contortus* in the Sudan.**—*Parasitology.* 1931. July. Vol. 23. No. 3. pp. 271-281. With 6 figs. [3 refs.]

"1. A technique is given for the detailed study of living cercariae in which reference is made to the value of human or horse blood serum as a mounting medium.

"2. As a fixative agent for cercariae prior to staining the use of hot lactophenol solution is recommended.

"3. A description is given of three non-furcocercous cercariae obtained from *Bullinus contortus* in the Sudan."

C. L.

STIVEN (H. E. S.). **Geographical Distribution of Cases of Egyptian Splenomegaly.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 77-78. With 1 map.

Deaths after splenectomy at the Port Said hospital for the last 3 years have been 10, 14.3 and 23.3 per cent. of all cases operated on, the increase being due to "the tendency to operate upon truly desperate cases as so often a remarkable cure results even in those with ascites." The paper contains a map showing distribution of the cases and Stiven hopes that future ones will bear out his theory that the condition is caused by *S. mansoni* and is found chiefly at the tail end of the canals in the Delta.

C. L.

GIRGES (Rameses). **The Causation of Egyptian Splenomegaly by Male *Schistosoma mansoni* alone.**—*Jl. Egyptian Med. Assoc.* 1931. May. Vol. 14. No. 5. pp. 282-304. [35 refs.]

In brief the line of proof put forward is that the incidences of Egyptian splenomegaly and infection by *S. mansoni* are the same in area, age, sex and occupation, that the former is preceded by symptoms of the latter, that there is analogy with infection by *S. japonicum*, that the only parasites recovered from these cases have been male schistosomes, that the cases improve under tartar emetic, show a marked complement fixation reaction so far as examination has gone, and that the liver and spleen show large quantities of haematoidin granules. There is free quotation of papers already abstracted in these pages.

C. L.

TALIAFERRO (William H.) & TALIAFERRO (Lucy G.). **Skin Reactions in Persons infected with *Schistosoma mansoni*.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Sept. Vol. 7. No. 1. pp. 23-35. [9 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan, & Dept. of Hyg. & Bact., Univ., Chicago.]

Since 16 per cent. of persons, whether infected or not with *Schistosoma mansoni*, react to extracts of uninfected snails' livers, that is of the posterior half of *Planorbis guadeloupensis*, control is necessary in every case.

"The intradermal injection of 0.025 cc. of a 0.5 per cent. saline extract of dried 'livers' of snails infected with *S. mansoni* elicited immediate skin reactions in the majority of persons infected with *S. mansoni*. Using as the criterion for positiveness the possession of pseudopods by the urticarial wheal and a negative reaction to some control extract, the following results were obtained in testing 120 persons: In tests on 53 persons with a known present or past infection, 40 were positive, 6 were negative and 7 were eliminated because of positive controls. In tests on 21 possibly infected persons from a highly infected endemic area, 8 were positive, 8 negative and 5 were eliminated because of positive controls. In tests on 46 uninfected persons, none were positive, 42 were negative and 4 had to be eliminated because of positive controls. Almost identical results were obtained where a reaction was considered positive if it exhibited a wheal of 10 mm. or more, or a wheal with pseudopods no matter its size, provided a control injection with some other extract was negative.....

"Positive immediate intradermal reactions were as common in persons with a past infection as with a present one.

"In 2 out of 4 cases, serums from persons giving a positive immediate reaction conferred a local passive reactivity on non-reactors.

"The serum from a reactor (Prausnitz-Küstner antibody) was neutralized when mixed with schistosomal extract (antigen). On the other hand, the schistosome extract was not neutralized when mixed with the serum from a reactor, but the series of dilutions were not sufficiently exhaustive to be conclusive.

"Well marked delayed intradermal reactions were rare and occurred in 5 of 50 persons with past or present infection, in 4 of 20 possibly infected persons from endemic areas, and in none of 46 uninfected persons. In all cases they occurred in persons who gave a positive immediate reaction."

The number of persons giving adequate data was 120. Preliminary scratch tests were made in every case but as none showed a marked reaction, all received the intradermal injection. Whether positive skin reactions to helminth extracts are "non-specific" and due to infections with other worms or are evidence of earlier infection is at present left open.

C. L.

MANDRY (O. Costa). **Human Infestation with *Fasciola hepatica*. Report of a Case occurring in Porto Rico.**—*Bol. Asoc. Med. de Puerto Rico*. 1931. May. Vol. 23. No. 188. pp. 186-192. [14 refs.]

In over 50,000 faecal examinations by smear and by an unspecified floatation technique eggs of *Fasciola hepatica* have been twice identified. One patient was a Venezuelan who had lived in Porto Rico for 8 years; the other had never left the island. Abdominal pain and

diarrhoea without hepatic enlargement were present in one case. The other was discovered on routine examination. Gentian violet is being tried.

C. L.

COUILLEN (F.) & AUDAIN (L.). Un cas de distomatose hépatique humaine à *Fasciola hepatica* dans la région parisienne. [**Case of *Fasciola hepatica* Infestation near Paris.**]—*Rev. Méd. et Hyg. Trop.* 1931. Mar.-Apr. Vol. 23. No. 2. pp. 86-90. [3 refs.] [Parasit. Lab., Faculty of Med., Paris.]

For more than two years a man living at Rueil had had recurrent attacks of diarrhoea with bilious vomiting; yet he got down 3 good meals a day. Microscopic examination of the stools showed eggs of *Fasciola hepatica*. The worms were not incommode by male fern, thymol or stovarsol.

C. L.

TOULLEC (F.) & RIOU (M.). Le tubage duodénal dans les affections à *Clonorchis sinensis*. [**The Duodenal Sound in *C. sinensis* Infestations.**]—*Bull. Soc. Path. Exot.* 1931. Apr. 15. Vol. 24. No. 4. pp. 286-287. [Colonial School of Health, Marseilles.]

The use of the sound is diagnostic. It is stated that in clonorchis infection the sound has displayed great abundance of eggs when none have been detected on 6 or 7 faecal slides.

C. L.

YOSHIDA (Inataro). Experimentelle Untersuchung ueber die harnsäure-spaltende Wirkung des Leber bei Kammchenclonorchiasis. (I. & II. Mitteilungen.) [**On the Action of the Liver of Clonorchis-infested Rabbits in splitting Uric Acid.**]—*Okayama-Igakkai-Zasshi* (Zent. d. Okayama med. Gesellsch.). 1931. Mar. Vol. 43. No. 3. pp. 566-573. [30 refs.] [In Japanese. German summary p. 574.]; 575-579. [4 refs.] [In Japanese. German summary p. 580.] [Inst. of Forsensic Med., Med. Univ., Okayama.]

i. The amount of uric acid converted to allantoin by liver pulp in given conditions is much less when the liver comes from a rabbit infected with clonorchis than when the rabbit is normal. Experiments to determine the actual cause of this restriction led to no result.

ii. The infected liver contains five times as much sulphate as the sound one.

C. L.

YOUNG (Shutsu). **The Changes in the Haematopoietic Organs and the Blood Picture in the Experimental Liver-Distomiasis.**—*Japanese Jl. Exper. Med.* 1931. Feb. 20. Vol. 9. No. 1. pp. 47-61. With 7 charts. [15 refs.]

Rabbits were used. If infestation was heavy the spleen became enlarged from passive congestion due to hepatic sclerosis; late and slight splenic sclerosis might cause some shrinkage. In the marrow heavy infection caused temporary increase in the myeloid series and megakaryocytes, little in erythrocytes. Lymphocytes appeared unaltered. The liver showed marked eosinophilia, and at first many lymphocytes but later plasma cells. In the blood leucocytosis was present only if infection were heavy, there was a maximum eosinophilia of 10·3, no striking change in red corpuscles or platelets.

C. L.

GUILLON. A propos du traitement des distomatoses hépatiques. [**Treatment for Hepatic Fluke Infestations.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.–May–June. Vol. 29. No. 2. pp. 332–336. [9 refs.]

By analogy from veterinary medicine male fern with castor oil, with castor oil and calomel, or with calomel only is advised for flukes in biliary passages of man.

C. L.

HINO (I.). Nachtrag zu den Fällen von Knotenbildung durch Distoma pulmonale. [**Nodule Formation by *Paragonimus westermani*.**]—*Taiwan Igakkaï Zasshi* (*Jl. Med. Assoc. Formosa*). 1931. Apr. Vol. 30. No. 4 (313). [In Japanese. German summary p. 32.] [Med. School, Taihoku, Formosa.]

Five extra-pulmonary nodules containing *Paragonimus westermani* have been discovered fortuitously when operating for some other condition. Three were in the great omentum and two in a hernial sac. They may reach the size of a walnut.

C. L.

YING (Y. Y.). **Paragonimus Infestation. A Report of Two Cases.**—*Nat. Med. Jl. China*. 1930. Oct. Vol. 16. No. 5. pp. 638–642. With 1 plate. [Red Cross General Hosp., Shanghai.]

Two cases with the usual chest symptoms and the paragonimus eggs in sputum and faeces are reported from Shaohsing, a new locality. In spite of treatment with sodium antimony tartrate, emetine, and gentian violet the cases went downhill and were removed from hospital.

C. L.

CHOY (Paul D.) & LUDLOW (A. I.). *Paragonimus westermanii*. **Encysted in the Sac of Inguinal Hernia.**—*China Med. Jl.* 1931. June. Vol. 45. No. 6. pp. 556–559. With 1 text fig. [5 refs.]

Their previous report (this *Bulletin*, Vol. 23, p. 754) on an odd habitat of this parasite concerned the finding of eggs in the abdominal wall in Korea. This paper describes two cases where the omental contents of inguinal herniae were implicated, eggs being found in the walls of cysts in one, and paired adults in a cyst in another. In the latter case eggs were present in the sputum.

C. L.

GALLI-VALERIO (B.) & BORNAND (M.). La distomatose à *Dicrocoelium lanceolatum* Rud. chez l'homme. [***D. dendriticum* Infestation in Man.**]—*Schweiz. Med. Woch.* 1931. June 27. No. 26. pp. 614–615. [16 refs.] [Inst. of Hyg. & Parasit., Univ., Lausanne.]

After a review of the literature the case is described of a girl with anaemia, haemoglobin 40 per cent., a few eggs of trichuris and a number of those of *D. dendriticum*. Treatment by thymol gm. 0.5 three times a day for 5 days, injections of solarsons and of milk were followed by disappearance of all helminthic eggs and an improvement of haemoglobin to 80 per cent. in 3 months. The injection doses are not stated.

C. L.

CAMERON (Thomas W. M.). **Experimental Infection of Sheep with *Dicrocoelium dendriticum*.**—*Jl. Helminthology*. 1931. Feb. Vol. 9. No. 1. pp. 41-44. [2 refs.]

Eggs of *D. dendriticum* were fed to the land snails *Helicella itala*. Cercariae developed in some, apparently identical with *Cercaria vitrina*. When fed to sheep with a clean history *D. dendriticum* developed.

C. L.

SCRIABINE (K. I.), PODYAPOLSKAYA (W. P.) & SCHOUZ (G. S.). **[Human and Animal Metagonimiasis in the Far East of U.S.S.R.]**—*Trop. Med. & Vel.* Moscow. 1930. Vol. 8. No. 6-7. pp. 16-25. With 3 text figs. [In Russian.]

In 1928 a helminthological expedition was sent to the Far-Eastern extremity of Siberia (including the Amur and Maritime provinces) to investigate the helminthic infections among the local native tribes. It is merely stated that diagnosis was based on the finding of ova in the faeces. The total number of cases examined was 1,172, 59.2 per cent. of which were found to be infected. The incidence of trematodes was especially high and among these *Metagonimus yokogawai* Katsurada, 1913, occurred in 13.5 per cent. of the cases. This is the first record of this parasite in man in the territory of U.S.S.R. It was also found in local cats, dogs and foxes. The greater part of this paper is devoted to a description of the morphology and biology of *M. yokogawai*, based on the material collected, together with an account of the clinical, therapeutic and prophylactic aspects of metagonimiasis.

C. A. Hoare.

BRUMPT (E.). Prurit et dermatites produits chez les nageurs par des cercaires de mollusques d'eau douce. **[Pruritus and Dermatitis in Swimmers produced by Molluscan Cercariae.]**—*C. R. Acad. Sci.* 1931. July 27. Vol. 193. No. 4. pp. 253-255.

Brumpt reviews the literature on the cercariae of water snails and bathing rashes (see this *Bulletin*, Vol. 27, pp. 960, 961) and describes an experiment in which, after placing 150 *Cercaria ocellata* from *Limnaea stagnalis* in contact with his skin for 10 minutes, 149 disappeared into it with pricking and redness, spots 1 mm. in diameter becoming papular in 16 hours, reaching 2 mm. in size in 24 hours with a purpuric centre, and not beginning to retrogress for 5 days. A newborn mouse had no attraction for them, nor had man for certain other cercariae.

C. L.

BRUMPT (E.). *Cercaria ocellata*, déterminant la dermatite des nageurs, provient d'une bilharzie des canards. **[Swimmer's Dermatitis caused by *C. ocellata* from Ducks.]**—*C. R. Acad. Sci.* 1931. Oct. 12. Vol. 193. No. 15. pp. 612-614. With 12 text figs.

By setting 4 ducks in a vessel containing *Cercaria ocellata* (this *Bulletin*, Vol. 27, pp. 960, 961) Brumpt has recovered from the

organs of all of them eggs which are identified as those of *Bilharziella polonica*, and which resemble those of *B. yokogawa*. Some fragments of adult worms were collected from portal veins. Eight controls were negative.

C. L.

STUNKARD (H. W.). **An Analysis of the Methods used in the Study of Larval Trematodes.**—*Parasitology*. 1930. Mar. 24. Vol. 22. No. 2. pp. 268–273. [15 refs.] [Biol. Dept., Univ., New York.]

"The advantages and difficulties of various methods employed in the study of larval trematodes are discussed. The desirability of using living specimens rather than fixed material and of studying mature, normally emerged cercariae rather than those obtained by crushing the host is noted. Intra-vitam staining with neutral red is recommended to demonstrate the form and reaction of the secretory granules in gland cells. Knowledge of the details of the excretory system is of major importance in both theoretical and experimental work."

C. L.

MAGATH (Thomas B.) & ESSEX (Hiram E.). **Concerning the Distribution of *Diphyllbothrium latum* in North America.**—*Jl. Preventive Med.* 1931. July. Vol. 5. No. 4. pp. 227–242. With 1 text fig. [29 refs.] [Mayo Clinic & Mayo Foundation, Rochester, Minnesota.]

A wide examination of Minnesota waters shows that the Mississippi watershed is free from this infection, while certain lakes draining into Lake Superior, and into the Canadian lakes and so into Hudson Bay, are affected. The arthropod hosts infected are *Diplotomus oregonensis*, *D. sicilis* and *D. siciloides*, the two last being new, while the fish found infected during the authors' 5 years investigations have been *Esox lucius*, *Stizostedion vitreum*, and *Perca flavescens*. While accepting the possibility that dogs and other animals may play a small part in spreading infection, the authors have demonstrated* that while 80 per cent. of eggs from man develop active coracidia, only 1.5 per cent. of eggs from dogs do so. Man must then, they conclude, be the essential reservoir of infection. Since coracidia live only 12 hours even in sheltered laboratory conditions they are unlikely to diffuse infection; while a normal period of development of at least two weeks in *Diplotomus* suggests that, if these animals migrate in nature, infection may be so carried. As regards eggs they will not develop at 4° C., and this is the temperature at the bottom of the Great Lakes at all times. Lake Winnipeg is, however, in a state of continual turnover and the temperature is at most times suitable for the larval development. It is the most heavily infected water, particularly at its southern end. Control of infection is believed to be possible if the public will realize the issue. Measures should include the treatment of all sewage by some killing solution, the eating or tasting of no fish unless properly cooked, the freezing of fish imported from Canada, since plerocercoids are killed by a temperature of –9° C. maintained for 48 hours, notification and disinfection of all human cases, stool examinations of all Baltic immigrants, and the stopping of feeding to dogs of raw fish species known to harbour the plerocercoids.

C. L.

* Evidence in the press.

PILOT (I.) & LEVIN (I. M.). **Native Infestation with *Diphylobothrium latum* (Fish Tapeworm). With a Report of 5 Cases in Children.**—*Amer. Jl. Med. Sci.* 1931. May. Vol. 181. No. 5. pp. 710-714. [10 refs.] [Med. College, Univ. of Illinois, Chicago.]

Five fresh cases of autochthonous infection are noted, all in Jewish children, three as usual obtained from sampling "gefüllte" fish and two probably from eating fish improperly cooked.

C. L.

MILLS (Edward S.). **Anaemia from *Dibothriocephalus latus*.**—*Canadian Med. Assoc. Jl.* 1931. July. Vol. 25. No. 1. pp. 75-77.

A Finn who had arrived in Canada 3 years earlier, and lived in Quebec since, gave a history of pallor of 6 or 7 weeks' duration. Haemoglobin 22, red corpuscles 910,000, blood simulating pernicious anaemia in practically every respect—high colour index, "leucocytes" reduced at the expense of the polymorphs, platelets below normal, diameter of red cells 9.9μ , plasma bilirubin elevated. There was also achlorhydria. In two and a half months after expulsion of the tapeworm his haemoglobin was 85, his red corpuscles 5,000,000, and gastric hydrochloric acid was normal, and this "without recourse to liver or other similarly acting substances."

C. L.

BECKER (Gösta). Ueber die Behandlung der Bothriocephalusanämie mit Leber und Leberpräparaten und mit Magenpräparat. [**Treatment of *Diphylobothrium* Anaemia with Liver and Stomach Preparations.**]—*Acta Med. Scandinavica.* 1931. Vol. 75. No. 3-4. pp. 227-240. [18 refs.] [2nd Med. Clinic, Univ., Helsingfors.]

The material consists of 19 cases of anaemia of pernicious type associated with *diphylobothrium* infection and treated with liver, liver extract, or stomach. In 18 cases the worms were left, in one expelled. In general, anaemia and reticulocyte reaction disappeared even in the still parasitized; but in two there was no response and in one but little. Two cases relapsed. Liver was more effective than stomach.

C. L.

i. KOBAYASHI (Hidekazu). **Studies on the Development of *Diphylobothrium mansonii* Cobbold, 1882 (Joyeux, 1927). (Fifth Report.) On the First Intermediate Host, and Development in the First Intermediate Host.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1931. Mar. Vol. 30. No. 3 (312). pp. 286-310. With 3 charts in text & 19 figs. on 1 plate. [In Japanese. English summary pp. 24-27.]

ii. —. (Sixth Report). **Development in the Second Intermediate Host and Plerocercoid in Natural Infection of Frogs and Musk-Rat (*Crocodyrus murina*).**—*Ibid.* Apr. No. 4 (313). pp. 363-380. With 3 text figs. [48 refs.] [In Japanese. English summary pp. 29-30.] [Govt. Med. College of Formosa, Taihoku.]

i. Only in cyclops species did the onchosphere develop. The susceptibility of the nine local species is described in terms of the numbers which reached the body cavity and grew to maturity in males and females. To all tests *C. leuckarti* was the best host, and in all cyclops species males were more readily infected than females.

Penetration and development in cyclops are described, the changes confirming established observations.

ii. Roughly speaking the plerocercoid grows twice as rapidly in the warm-blooded rat or mouse as in the cold-blooded frog, reaching 70-170 mm. in length in 35 days in the former and 16-37 in the latter. The percentage of natural infection of frogs in and about Taihoku is 4 in early spring, 59.6 in June to September, and 67.11 in October and November; while in the musk rat there are [? corresponding] seasonal differences of 10 to 19.5. In the frog most plerocercoids are in the femoral muscles, in the rodents in the adipose tissue of the neck and interscapular region. The local percentage infection rate with the strobile is 42.3 for cats and 10.71 for dogs.

C. L.

STORI (Edoardo). Anemia sperimentale da Botriocefalo. [**Experimental Diphylobothrium Anaemia.**]—*Haematologica*. I. Arch. 1931. Vol. 12. No. 3. pp. 237-261. With 4 coloured figs. on 2 plates. [3 pages of refs.] French summary. [Inst. of Anat. & Comparative Physiol., Univ., Pavia.]

By feeding to dogs larval forms of *Diphylobothrium ranarum* found in porcupines Stori has produced a grave and even rapidly fatal anaemia with loss of as much as half the body weight, a fall of red corpuscles to 1,000,000 and a disproportionate fall in haemoglobin. The bone marrow showed evidence of overaction. Haemosiderosis was intense in all haemopoietic organs.

C. L.

GUNN (Herbert). **The Treatment of Tape Worm through Duodenal Tube.**—*Amer. Jl. Trop. Med.* 1931. July. Vol. 11. No. 4. pp. 273-277. [6 refs.] [Med. School, Stanford Univ., San Francisco, California.]

The literature is reviewed, and 12 cases of *T. saginata* infection reported. The method was: liquid diet for a day and a half and a prepurge of castor oil the morning before treatment with an enema that night; next morning fasting, or at most, after a cup of coffee, the injection, through a tube whose end was ascertained to lie in the duodenum, of a warm suspension of Extr. filicis liq. 5ij, saturated solution of Epsom salts 5i, made up to about 5iij with gum acacia mucilage, given in two halves at half hour intervals; another half ounce of Epsom salts [? solution] in an hour; and thereafter a syringe-ful of water till the bowels acted, or if they did not act an enema 3 hours after the last dose of vermifuge. All patients were cured without anxiety, including one whose previous experience induced him to ask whether it was advisable to make a will before treatment.

C. L.

KEILMAN (W. I.). [**The Influence of Helminths upon Sterility.**]—*Trop. Med. & Vet.* Moscow. 1930. Vol. 8. No. 10. pp. 51-52. [In Russian.]

A married woman had given birth to a child three years previously, and complained of subsequent sterility. A gynaecological examination

revealed no cause of sterility. Half a year later the woman passed part of the strobila of a tape-worm, $\frac{1}{2}$ metre long. Specific treatment was prescribed and an entire *Taenia saginata* expelled. After one menstrual period the patient became pregnant and duly gave birth to a child.

C. A. Hoare.

LOEPER, SOULIÉ & TONNET. Oxalémie et taenia. [**Oxalaemia and Taenia.**]—*Bull. et Mém. Soc. Méd. Hôpil. de Paris.* 1931. June 8. Year 47. 3rd Ser. No. 19. pp. 952-955. [4 refs.]

This group of authors reports further on this subject (see this *Bulletin*, Vol. 28, p. 679). Their conclusions are that intestinal parasites, particularly taenia, can produce oxalic acid in the main from the glycogen they contain; that this is an important cause of their toxicity and that oxalate may be precipitated in the kidney.

C. L.

BARBERI (Rafael). Diagnostico retrospectivo. Un caso de cisticercosis cerebral. [**A Case of Cerebral Cysticercosis diagnosed at Autopsy.**]—*Repert. Med. y Cirug.* Bogotá, 1931. May. Vol. 22. No. 5 (257). pp. 225-230. With 3 text figs.

Cysticercus cellulosae at the base of the second left frontal convolution of a child of 3 produced convulsions involving particularly the left side of the face and right side of the body, and copper-reducing substance in urine and cerebrospinal fluid. Death occurred within six hours of the onset.

C. L.

DÉVÉ (F.). Sable échinococcique et rivanol. [**Hydatid Sand and Rivanol.**]—*C. R. Soc. Biol.* 1931. June 19. Vol. 107. No. 20. pp. 682-683. [1 ref.]

PASINI having recently recommended a 2 per mille solution of rivanol as a parasiticide to be used for injecting into a hydatid cyst, Dévé points out that time of contact is an essential factor. His experiments lead him to conclude that a fluid of this strength must be left in the emptied cyst for 10 minutes to kill scolices, which may mean material prolongation of the operation. He suggests that a solution of 4 or 5 per mille left for 5 minutes may prove effective.

C. L.

ZONTSCHIEW (W. T.). Beitrag zur Untersuchung des Echinokokken-antigens. [**Contribution to the Study of Echinococcus Antigen.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. June. Vol. 25. No. 6. pp. 365-373. [20 refs.] [Med. Clinic, Univ., & Inst. for Health Education, Sofia, Bulgaria.]

Thirty cases were examined and the author's conclusions are these. A fruitless attempt was made to produce an antigen for a precipitin test for echinococcus on Kahn's lines. Moreover the alcoholic extract proved unspecific both for complement fixation and the skin test. On precipitation of hydatid fluid with alcohol the skin antigen is precipitated, while the complement fixation antigen loses its specific character and perhaps remains in solution. With the complete antigen Fülleborn's skin reaction gave no clear positive result. A positive early reaction (Casoni's) serves for diagnosis if a control with 1 per cent. peptone is negative. The intradermal reaction cannot take the

place of Weinberg's test. In two cases complement fixation was weaker with the specific [eigenem] antigen than with the sheep antigen of the laboratory. No paper in English is quoted in the references.

C. L.

COUTELEN (F.). Présence, chez les hydatides echinococciques, de cellules libres à glycogène et à graisses. Leur rôle biologique possible. [**Presence in Hydatids of Free Cells containing Glycogen and Fat.**]—*Ann. Parasit. Humaine et Comparée*. 1931. Mar. 1. Vol. 9. No. 2. pp. 97–100. With 1 text fig. [4 refs.]

——. Histogenèse des cellules libres, à glycogène et à graisses, des hydatides echinococciques. [**Histogenesis of the Free Cells in Hydatids.**]—*Ibid.* pp. 101–103. With 1 text fig. [2 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Particularly by the use of vital staining it may be shown that the germinal membrane and proliferating vesicles of hydatids are built up of distinct cells. Moreover, when examining particles of the membrane between slide and cover there are found certain free cells 10 to 30 μ or more in diameter, very refractive, the refractive granules few and small or larger or even coalescing to form a single globule. They are fatty. In addition, staining shows glycogen to be present, and the more fat there is in a cell the less glycogen.

C. L.

MILLER (Harry M.), Jr. **Further Experiments on Artificial Immunity to a Larval Cestode.**—*Proc. Soc. Experim. Biol. & Med.* 1931. June. Vol. 28. No. 9. pp. 884–895. [1 ref.] [Zool. Dept. Washington Univ., St. Louis, Mo.]

After the giving of immunizing injections to rats with suspensions or extracts of *Taenia taeniaeformis*, its cysticercus (*C. fasciolaris*) completely or almost completely failed to develop in them. Injections of *T. pisiformis* had no such effect.

C. L.

LOPEZ-NEYRA (C. R.). Relations du *Davainea madagascariensis* et des espèces parasites des mammifères. Considérations sur les *Davainea*. [**The Species of Kollania (Davainea) infesting Mammalia.**]—*Ann. Parasit. Humaine et Comparée*. 1931. Mar. 1. Vol. 9. No. 2. pp. 162–184. With 9 figs. [10 refs.] [Lab. of Zool. & Parasit., Faculty of Pharmacy, Univ., Grenade.]

It is concluded that *Kollania demerariensis* (Daniels, 1895) is a good species with unilateral pores, normally inhabiting American animals; and that into synonym with *Kollania madagascariensis* (Davaine, 1869) fall *Railletina celebensis*, *R. funebris* and probably *R. fluxa*, the worm being a normal inhabitant of Asiatic murids.

C. L.

JOYEUX (Ch.) & DOLIFUS (R. P.). Un nouveau cas de *Bertiella studeri* (R. Bl.) chez l'homme. [**A Human Case of Infection by Bertiella studeri.**]—*C. R. Soc. Biol.* 1931. May 8. Vol. 107. No. 14. pp. 35–36.

Material at the Natural History Museum, Munich, yielded a specimen catalogued as collected by MAURER at Deli, Sumatra.

C. L.

TARAMELLI (N.) & DUROIS (A.). Un cas de coenurose chez l'homme. [**Case of Coenurus Infestation in Man.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. June 31. Vol. 11. No. 2. pp. 151-154. With 1 text fig. [3 refs.] [School of Trop. Med., Brussels.]

A young forest-dwelling native woman of the Eastern Province of the Belgian Congo, annoyed by the disfigurement, came for the removal of a tumour about as big as a pigeon's egg on the anterior surface of the right forearm. It turned out to be a coenurus cyst containing 145 heads arranged more or less in 6 groups, and is identified as *Multiceps glomeratus* corresponding to that described by TURNER and LEIPER (this *Bulletin*, Vol. 15, p. 223).

C. L.

KAMALOW (N.). Beobachtungen an *Hymenolepis diminuta* (Rudolphi, 1819). [**Observations on *H. diminuta*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Oct. Vol. 35. No. 10. pp. 606-611. With 6 text figs. [People's Commissariat for Public Health (N.K.S.) of Georgia, Tiflis.]

The report is based on 5 cases, worms being recovered from two by Filix mas. They measured 48 and 36 cm. long, other measurements being within accepted limits. Eggs remain alive for 2 months in faeces and all of them for 6 months in 1 in 1,000 watery solution of cosin and methylene blue; they withstand drying for 20 hours, but the expressed oncosphere does so for a few minutes only. No success attended efforts to carry infection to white rats through the cockroaches *Periplaneta orientalis* and *Blatta germanica*. Wild rats in Tiflis were infected to 44 per cent. with from 1 to 13 worms 17 to 109 cm. long.

C. L.

OLDHAM (J. N.). On the Arthropod Intermediate Hosts of *Hymenolepis diminuta* (Rudolphi 1819).—*Jl. Helminthology.* 1931. Feb. Vol. 9. No. 1. pp. 21-28. [16 refs.]

Oldham has infected larvae of *Ceratophyllus wickhami* with *H. diminuta*, cites the 23 arthropods which have hitherto been found capable of acting as hosts, and notes whether infection has occurred as larva or imago. It may be useful to cite the others. Two myriapods *Fontaria virginensis* and *Julus* sp. The rest are insects—*Blatta orientalis*, *Blattella germanica*, *Periplaneta americana*, *Anisobasis annulipes*, *Tinea granella*, *T. pellionella*, *Aglossa dimidiata*, *Aphornia gularis*, *Pyralis farinalis*, *Leptopsylla musculi*, *Ceratophyllus fasciatus*, *Ctenocephalus canis*, *Pulex irritans*, *Xenopsylla cheopis*, *Dermestes peruvianus*, *Geotrupes sylvaticus*, *Akis spinosa*, *Scaurus striatus*, *Tenebrio molitor*, *Tribolium castaneum*, *Ulosonia parvicornis*.

C. L.

BACIGALUPO (J.). Evolution de l'*Hymenolepis fraterna* Stiles, chez *Pulex irritans* L., *Xenopsylla cheopis* Rothschild et *Ctenocephalus canis* Curtis. [**Development of *H. fraterna* in *P. irritans*, *X. cheopis* and *Ct. canis*.**]—*Ann. Parasit. Humaine et Comparée.* 1931. July 1. Vol. 9. No. 4. pp. 339-343. With 2 text figs. [8 refs.] [Central Milit. Hosp., Buenos Aires.]

The intermediate hosts of *Hymenolepis fraterna* Stiles are now enlarged to include *Ctenocephalus canis*, *X. cheopis*, *P. irritans*, *Tenebrio molitor*

and *T. obscurus*. Infection takes place in the larva and may be carried to the cercocystis stage either in larval or adult arthropod.

C. L.

POTAPENKO (N. A.) & GOUSÉWITCH (A. W.). [A Case of Multiple Invasion of Man by *Hymenolepis diminuta*.]—*Trop. Med. & Vet.* Moscow. 1930. Vol. 8. No. 8-9. pp. 28-29. [In Russian.]

Eggs of *H. diminuta* were found in the faeces of a girl who has been suffering from chronic pains in the upper region of the abdomen for about three years. After treatment with male fern extract nineteen specimens of this cestode were expelled. No signs of infection could be found on subsequent examination, and the child rapidly improved in health. It was established that the house in which the girl lived was infested with rats and the food was liable to be contaminated.

C. A. Hoare.

COBB (N. A.). **Some Recent Aspects of Nematology.**—*Science*. 1931. Jan. 9. Vol. 73. No. 1880. pp. 22-29.

Cobb has examined to his great dissatisfaction the treatment of nematology in 250 zoological and biological text books written in English, 50 being recent. "The errors, both of commission and omission, are almost incredible." The most grave are: The failure to state that nemas moult, have no cilia, have spinnerets, have no striated muscle, and that ascaris is not a typical form; the inclusion of Gordiaceae, Acanthocephala and Chaetognaths in the phylum; the failure to state that all movements are in the dorso-ventral plane, that free living nematodes are the typical forms, that parasitic forms attack plants as well as animals, that there are longitudinal lines other than the lateral ones, and that these latter are not necessarily excretory. Less grave errors are: the statement that hermaphroditism is rare, that locomotor organs are necessarily absent, that the only sense organs are on the lips; the implication that the nemic structure is simple; the statement that the life history is usually very complicated; the failure to stress their historical significance in biology such as the discovery of the coalescence of gametes and the sharing of their chromatin; the statement that nematologists exaggerate differences between related forms; the continued use of the word "worm," and a "round" worm may be no rounder than many another "worm"; the use of the word "chitin" for something which is very different; statements that nemas live on juices, are but slightly degenerate when parasitic, and are entirely devoid of segmentation; their collection into few families. There is a plea for the proper use of the microscope, thus making the nematode a fascinating study even for the dainty and refined girl student before whom to place an ascaris is felt to be a disgusting procedure. There is pointed out the immense economic importance of nemas in human and veterinary medicine and in agriculture and it is urged that most trained zoologists need to take a few weeks' course of study with original nemic literature and a microscope with a good oil immersion lens.

C. L.

OTTO (G. F.), CORT (W. W.) & KELLER (A. E.). **Environmental Studies of Families in Tennessee infested with Ascaris, Trichuris and Hookworm.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 156-193. [36 refs.]

This seems to be largely based on work already published but it will repay study. It is concluded that ascaris infection is directly related to defaecation habits, and regarding these the following quotations dealing with rural families in Tennessee show an amazing condition. "In their attitude towards the disposal of human excrement these people are in general surprisingly primitive. . . . The use of even the simplest privy seems a new idea. . . . In some isolated communities which we visited, even some of the wealthier families who lived in large well-built houses and had reached the stage of the automobile and the radio, were still entirely without privies. . . . Where the privies are exclusively used they of course gradually eliminate ascaris infection. . . . Of special interest are the number of families where heavy ascaris infestation exists in spite of the presence of privies." [It seems almost completely forgotten that STILES showed (*Public Health Reports*, 1915, July 2) that for the dissemination of ascaris and other coprophagic infections a privy may itself have a *radius of influence* for evil.] Human ascaris and trichuris eggs were found in chicken droppings, though about an eighth of eggs were broken up, evidently by the gizzard. Regarding the viability of eggs which have passed through animals in experiments, the percentage numbers were 16.5 to 40.5 in 3 chickens, 52.3 to 76.2 in 3 dogs and 69 in one cat. Trichuris infection was lower than but parallel to ascaris infection. Hookworm infection was found definitely correlated with sandy soil, thus confirming once more STILES'S observation nearly 30 years old. Enumeration in experimental cases was by Stoll's technique and, when this failed [as it must do in light cases] by D.C.F. (direct centrifugal floatation).

C. L.

LAMSON (P. D.), CALDWELL (E. L.), BROWN (H. W.) & WARD (C. B.). **Hexylresorcinol in the Treatment of Human Ascariasis.**—*Amer. Jl. Hyg.* 1931. Mar. Vol. 13. No. 2. pp. 568-575. [5 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

—, BROWN (H. W.), ROBBINS (B. H.) & WARD (C. B.). **Field Treatments of Ascariasis, Ancylostomiasis, and Trichuriasis with Hexylresorcinol.**—*Ibid.* May. Vol. 13. No. 3. pp. 803-822. [32 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

Examination of records of the International Health Board covering several million treatments showed the authors that only when carbon tetrachloride came into use did there appear records of deaths due to activation of ascarids by the drug. The tests of hexylresorcinol now reported are an attempt to find a non-toxic ascaricide, and this drug was "active on ascarids in vitro killing them without initial stimulation." Colorimetric tests indicate that most of the drug is unabsorbed from the host's intestine.

"Up to this time the most effective anthelmintics with the exception of tetrachlorethylene have been substances which were toxic or produced severe symptoms if absorbed, and great stress has been put upon the use of cathartics shortly after treatment in order to eliminate the drug and

prevent absorption. With hexylresorcinol this danger does not have to be avoided, which puts the drug in an entirely different class and may possibly allow its general use by the laymen, as one need not fear intoxication from lack of elimination."

[This statement cannot be passed. CAIUS and MHASKAR (this *Bulletin*, Vol. 17, p. 75) showed that when thymol was properly particulated all was absorbed, none being found in the faeces by tests which detected the loss of 5 per cent. of half a grain, and this even when the drug was given with Epsom salts which produced active purgation within 45 minutes. The abstract says, "*The necessity of the after purge becomes therefore questionable . . .*" The authors maintain that their work shows that hookworm treatment may be effectively reduced to the simple ingestion of the drug in proper dosage."* It remains to add that properly particulated thymol had an anthelmintic efficiency in the hands of these careful workers exceeded neither by oil of chenopodium nor carbon tetrachloride.]

The number of cases reported on is 1,500; the drug was given in crystalline form in hard gelatin capsules.

"Enormous clinical experience with this substance shows that it can be taken in very large amounts with no signs of intoxication." Nevertheless, "when such capsules are given to dogs and the stomachs examined within 4 or 5 hours after the administration of the drug some animals show nothing whatever, while in others irritation varying from small reddened areas to a general reddening with petechial haemorrhages . . . were seen . . . 24-48 hours after administration all signs of irritation have practically disappeared." "Children of six and eight years of age have been given as much as 1 gram of hexylresorcinol in a single dose but as some of these children had a certain amount of gastric irritation and as a dose of 0.6 to 0.8 gram was found effective, a large dose was considered unnecessary."

As regards efficacy, all depends on scrupulous abstention from all food, for the drug combines with albumen and becomes inert.

	Percentage of original numbers of eggs remaining				Percentage of cases remaining infected			
	Drug followed by				Drug followed by			
	Water		Mineral Oil		Water		Mineral Oil	
	Cases unfed	Cases fed	Cases unfed	Cases fed	Cases unfed	Cases fed	Cases unfed	Cases fed
Ascaris ...	12	24	8	57	53	60	30	60
Hookworms ...	21	89	23	35	46	55	43	100
Trichuris ...	34	38	33	36	60	58	54	100

Similarly given with vegetable oil or glycerine it is pleasant but little active; given with mineral oil there is slightly increased efficiency, offset by the disagreeable taste of the oil violently objected to by many

* Italics in abstract.

young children. Capsules of the crystals placed on the back of the tongue "would seem to be an ideal form of administration except for the fact that the crystals react with the gelatin after a time and such capsules are not stable." The efficiency of 0.8 gm. given to children between 7 and 14 years has varied between leaving none infected with ascaris in a school where the regime was strict, and the passage of almost no parasites in another group the members of which had almost all eaten breakfast before taking the drug; so it is suggested, though the matter has not been tested, that the evening meal should be limited to a little bread and milk, followed by salts on rising, hexylresorcinol being given several hours later, the first food of that day taken 4 or 5 hours after the drug. Other percentage figures of the drug's anthelmintic value in the same dose are shown in the table.

Egg counts were by the Stoll-Hausheer method which uses for each examination one two-hundredth of a gram. "*Our results are based on the accuracy of this method. The cases reported as negative after treatment were examined by this same method.*"* The egg numbers were reduced to a "formed basis."

C. L.

BROWN (H. W.). Effect of Hexylresorcinol upon Ascaris and Hookworm Eggs.—*Proc. Soc. Experim. Biol. & Med.* 1931. June. Vol. 28. No. 9. pp. 1036–1039. [5 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

Ascaris eggs were obtained from the anterior 2 inches of the chopped uteri and well shaken to prevent their forming large adherent masses, for if these persist the eggs in the centre develop normally in the fluids here reported on. Hexylresorcinol is soluble in tap water to about 0.05 per cent. Ascaris eggs may remain in this solution for 15 hours without damage; after 27 hours some, and after 16 days all, are killed. In a 0.01 per cent. solution development is normal. In a 0.1 per cent. solution in 0.2 per cent. of sodium bicarbonate most eggs are killed in 2, and all in 5 hours, yet it is held that an efficient solvent considerably decreases the effect of the drug since a solution of this strength in 30 per cent. glycerine or 1 per cent. caustic potash did not prevent normal development of eggs. When the albuminous coating is first dissolved in this last fluid, 0.1 per cent. hexylresorcinol solution kills in 15 minutes, and it is apparently held that the usual deep brown colour of the eggs is a property of the protoplasm and not of this coating since it is said that immediately after their immersion in 1 per cent. hexylresorcinol "they appeared cleared, the cytoplasm changing from the usual deep brown to a very light yellow." From eggs which have lain in hexylresorcinol, 1 per cent. caustic potash does not dissolve the albuminous coating in 48 hours. Resorcinol solutions up to 1 per cent. permit normal development. Hookworm eggs obtained by washing after floatation are killed in 24 hours by a 0.05 per cent. solution of hexylresorcinol. The strength which killed them in fluid faeces is not precisely stated. In 0.05 per cent. solution "early filariform larvae" were all dead in 10 minutes. The best distinction between live and dead ascaris eggs is held to be their behaviour when placed in a favourable medium.

C. L.

* Italics in original.

CORT (W. W.). **Recent Investigations on the Epidemiology of Human Ascariasis.**—*Jl. Parasitology*. 1931. Mar. Vol. 17. No. 3. pp. 121-144. [31 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

As the result of egg counts by Stoll's technique and of examination of soil for ascaris eggs, soil pollution by younger children has been convicted as a fertile source of infection. Infection is familial, 50 per cent. of the worm load lies on 5 per cent. of the inhabitants, and the crowded conditions of poorly sanitated cities greatly favour its spread. The resistance of the eggs to desiccation is considerable but not complete, and it is suggested that prolonged drought, the heat of direct tropical sunrays, and prolonged cold are the seasonal elements making for lessening of infection. The rapidity of reinfection is emphasized, as is the need to provide privies usable by children.

"Since the presence of this parasite in both cities and rural communities over such wide areas of the world can be used as an index of the status of sanitation it seems that campaigns for its control might form a larger part than at present of programs for the improvement of sanitary conditions."

C. L.

MORGAN (D. O.). **Some Observations on Experimental Ascariasis in Pigs.**—*Jl. Helminthology*. 1931. July. Vol. 9. No. 3. pp. 121-128. With 1 graph. [4 refs.]

Three pigs when two months old and again when three months old, were fed with large numbers of embryonated eggs of *A. lumbricoides* from the pig. They developed no symptoms and passed no eggs. When 5 months old these three and another from the same litter received much larger quantities of embryonated eggs, and all died with large numbers of larvae in livers and lungs. Half the lungs of one were fed to another pig, and extractions of the liver and of the other half of the lungs were divided between two more. They developed no symptoms since, as it is put, "the larvae had already completed the migratory part of their life history in another pig." Each had a natural infection but the number of eggs to a modified Stoll technique increased 10 and 13 fold in two of them in 3 weeks. From the 8th to the 22nd week the numbers fell almost to vanishing point, and unfertile eggs only were found from the 16th week. Two of these pigs were killed 3 weeks later; one contained no ascarids, the other two unfertile females. When 10 months old the third was given a large dose of embryonated eggs from an old culture in which many of them were non-viable. It died from pneumonia with large numbers of larvae in the lung, and a fair number in the intestine, which contained also two unfertile females. It is pointed out that neither ageing nor present infection of the host prevented infection, but that the worm load was almost entirely lost in 22 weeks even with the chance of reinfection not eliminated, suggesting self cure or an acquired immunity of short duration.

C. L.

BUCKLEY (J. J. C.). **An Observation on Human Resistance to Infection with Ascaris from the Pig.**—*Jl. Helminthology*. 1931. May. Vol. 9. No. 2. pp. 45-46. [3 refs.]

About 20 ascaris larvae from the lung of a young pig were swallowed by the author, while large numbers were fed to a green monkey and to young pigs. Only the last became infected and they heavily so. No mention is made of control feedings to pig or man.

C. L.

NOWAK (H.). Ueber Häufigkeit, Symptomatologie und Therapie der Askariasis. [**Prevalence, Symptomatology and Treatment of Ascariasis.**]—*Med. Klin.* 1931. Apr. 17. Vol. 27. No. 16 (1375). pp. 581-583. [17 refs.]

Of 1934 country people examined in Vienna 72.5 per cent. gave a history of passing ascaris and, it is noted, this means a considerably lower figure than that which would be recorded by faecal examinations for eggs. Over 46 per cent. of the infected were between 5 and 15 years of age. There were 838 infections in males as against 566 in females; the greatest number of infections was found in May and the lowest in January, but the percentage of infected to examined for different months is not stated. Regarding skin reaction to the intradermal injection of antigen, 4 of 18 persons who gave a history of passing worms were negative to it. In 9 of 11 patients, with history of passing ascariids within 1 to 5 years but in whom no eggs were found in the faeces, presumably by smear, at the time of examination, the reaction was positive. Treatment was by oil of chenopodium in hard gelatine capsules in "Deeks'" dosage, without ill effects, 75 per cent. being free from relapse [Rezidivfreiheit] after it.

C. L.

SMIRNOW (G. G.). Ueber die Wirkung der Anthelminthica auf die Wanderung der Ascaridenlarven. Experimentelle Untersuchungen. [**Effect of Anthelmintics on the Migration of Ascarid Larvae.**]—*Ztschr. f. Parasitenk.* 1931. Apr. 20. Vol. 3. No. 2. pp. 173-184. [13 refs.] [Zool. Inst., Military Med. Acad., Leningrad.]

After a consideration of the literature, *in vitro* experiments are described, the material being ripe ascaris eggs whose embryos had been artificially hatched by pressure between slide and cover. A saturated solution of santonin in olive oil was no more lethal to these larvae than the oil alone; a saturated watery solution of sodium santonate killed all in 5 hours, while a minority survived in water after 24 hours. In a tenth-saturated watery solution of the santonate most were alive after 24 hours whether bile was added or not; and a few after 48 hours, in the solution without bile, the effect of the addition of bile for 48 hours not being noted. Pure bile and oil of chenopodium were more deadly. A dose of santonin of 0.5 gm. ($7\frac{1}{2}$ grains) per kilo was sometimes, a larger one always, fatal to guineapigs, the symptoms being tremors, convulsions, staggering and cramp.

Ten guineapigs were fed with larvae of *A. suilla* or *A. megalcephala*, and for 0-10 days before and for 2 days after the feeding had oral doses of santonin from 0.1 to 0.5 gm. Nine of them died and from the livers of all and the lungs of seven of them larvae were obtained. Like results followed injections of sodium santonate and oil of chenopodium

by mouth. No effect on larval wandering within the body was, then, produced by these huge doses of the drugs. It is pointed out that the mode of action of "santonin-bile" on adult ascarids is outside the scope of the investigation.

C. L.

TAYLOR (E. Leonard) & PURCHASE (Harvey S.). **Do Penetrating Nematode Larvae assist Bacterial Invasion from the Bowel?**—*Parasitology*. 1931. July. Vol. 23. No. 3. pp. 301–309. [19 refs.]

In these experiments ascaris eggs containing infective embryos were fed to guineapigs who at the same time received vegetative forms of spores of anthrax; no infection was produced. Suspension of *Bact. suispestifer* in 1/25 cc. dosage having proved consistently fatal to rabbits and 1/75 cc. occasionally so, the latter dose was given with embryonated eggs. No death resulted in 5 rabbits, nor did any follow in 5 others to which the bacillus alone was fed. "The most likely explanation for the apparent failure of the ascaris larvae to assist infection with *B. suispestifer* appears to be that the number of bacteria entering the tissues with the larvae is insignificant compared with the number which enter without their aid." That the larvae penetrated the alimentary mucosa was shown by their recovery from the lungs where they were apt to produce a so-called verminous pneumonia. Reference is made to the positive experiments which have followed cutaneous infections.

C. L.

PERKINS (William Harvey). **Studies on the Hookworm Larva as a Vector of Pathogenic Micro-Organisms: Ingestion of Bacteria by Hookworm Larvae.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Apr. Vol. 28. No. 7. pp. 754–756. [1 ref.] [Med. School, Tulane Univ. & Charity Hosp., New Orleans.]

The author's conclusions were as follows:—

"1. The mouth parts and alimentary canal of immature larvae of *Necator americanus* are of such size as to accommodate particulate matter of bacterial magnitude. 2. Particles morphologically resembling colon bacilli and staphylococci have been seen within various portions of the alimentary canal of immature larvae of *Necator americanus* which had been living in a medium containing these micro-organisms. 3. Sheathed larvae of *Necator americanus* have been seen to carry bacteriform bodies within their sheath spaces for periods of from 1 to 31 days after the second ecdysis."

No staining was employed.

C. L.

BLACKIE (W. K.). **Observations on the Immunity Response in Experimental Ascariasis in Rabbits.**—*Jl. Helminthology*. 1931. May. Vol. 9. No. 2. pp. 91–96. With 1 graph in text. [5 refs.] [School of Hyg. & Trop. Med., London.]

The author points out that owing to the definite migratory route of *Ascaris lumbricoides* through the liver and lungs of the host prior to its final localization in the intestine, a definite serological response might be anticipated. To test this idea two rabbits were experimentally

infected with the embryonated eggs of *Ascaris megalcephala*, their sera being tested by means of the complement fixation reaction using an antigen prepared as an alcoholic extract from the dried powered egg-containing uterus of the adult female. A definite immunity response was noted during the first five weeks of infection, and an interesting graph is included showing a rise of titre to 18 M.H.Ds. of complement on the 15th day after exposure.

N. Hamilton Fairley.

GÉBEL (Georges). Recherches sur les lésions pathologiques provoquées par les ascarides et sur la fréquence de ces vers dans le canton de Genève. [**Lesions caused by Ascarids. Their Frequency in Geneva Canton.**—*Rev. Méd. Suisse Romande*. 1931. Apr. 25. Vol. 51. No. 5. pp. 264–290. With 11 figs. [14 refs.]

Instances of well recognized ill-effects of larval and adult ascarids are described and illustrated. Microscopic examination of the stools of 142 children up to 16 years of age showed ascaris eggs in 7.1 per cent.; half of the infected showed trichuris eggs also. There were no eggs in 68 adults. At autopsy adult ascarids were found in 2 of 18 children and 3 of 393 adults. Using two fresh smears in each instance ascaris eggs were found in 1 of 300 excised appendices.

C. L.

GRUBER (Georg B.). Bauchfellentzündung durch Askariden. [**Peritonitis caused by Ascarids.**—*Muench. Med. W'och.* 1931. July 3. Vol. 78. No. 27. pp. 1129–1131. [16 refs.] [Path. Inst., Univ., Göttingen.]

A boy of 3 passed about 60 ascarids after santonin; four weeks later he got measles with pneumonia and faecal vomiting. He died immediately after laparotomy which disclosed general peritonitis with a number of ascarids in the peritoneal cavity. Autopsy showed that they reached it through a perforation 75 cm. above the ileocaecal valve.

C. L.

PATERSON (A. S.). **Pulmonary Abscess caused by *Ascaris lumbricoides*.**—*Jl. Roy. Nav. Med. Serv.* 1931. July. Vol. 17. No. 3. pp. 211–212.

A right-sided localized pleurisy, with effusion as the needle showed, with small haemoptyses, intermittent rises in temperature but no night sweats, suggested tuberculosis, though 45 sputum examinations showed no bacilli and guineapig inoculation of the pleuritic fluid was negative. After more severe haemoptyses and a right sided phrenectomy (the illness having lasted over 9 months) he expectorated a female ascaris 8 in. in length. It is noteworthy that there is no mention of eggs in the sputum. After a thoracoplasty progress has been made.

C. L.

NANDI (P.). & GANGULY (Rabindranarayan). **Anthelmintics against *Ascaris lumbricoides*. A Comparative Study of their Efficacy.**—*Calcutta Med. Jl.* 1931. Apr. Vol. 25. No. 10. pp. 359–363. [5 refs.]

Tests were carried out with 1 per cent. solutions on earthworms only, it being stated [optimistically] that "the action of the drugs on earthworm and ascaris has been found to be almost identical." The drugs are placed in this order: *Serratula anthelmintica*, *Embelia ribes*, *Butea frondosa*, thymol, "carbon-tetrachlor," turpentine oil, santonin, oil of chenopodium, betanaphthol.

C. L.

HENRY (A.). L'infestation prénatale dans l'ascaridiasc des carnivores. [**Prenatal Infestation of Carnivora with Ascaris.**—*Bull. Acad. Méd.* 1931. Mar. 17. Year 95. 3rd Ser. Vol. 105. No. 11. pp. 462-464.

In 3 stillborn fox cubs of a litter many living ascarid larvae were recovered from the lungs and trachea, the lung tissue being marbled with fine haemorrhages.

C. L.

BEARUP (A. J.). **The Intensity and Type of Hookworm Infestation in the Ingham District of North Queensland.**—*Med. Jl. Australia.* 1931. July 18. 18th Year. Vol. 2. No. 3. pp. 65-74. [10 refs.] [School of Public Health & Trop. Med., Sydney.]

In the town of Ingham the sanitary service is a double pail one; in rural parts 10 per cent. of farms are without privies and 75 per cent. of privies allow soil pollution, while night soil is buried in or thrown amongst the sugar cane. For this investigation large faecal specimens were obtained in tins which reached the laboratory within 24 hours and were there kept at about 6° C. Counts were by the Caldwell's method and if two such films showed no eggs but D.C.F. did, the count was entered as 25 eggs per gram. A consistency allowance was made although the grounds for doing so are held to be far from satisfactory since there are so many sources of error affecting egg counts that it is not worth while to make more than one on each specimen. Faecal specimens kept in cold storage for 8 weeks showed no loss of ova to the Caldwell's method; but they were in fact injured, for after a day or two in the cold the eggs failed to develop beyond the tadpole stage when placed in favourable conditions. Instances of familial [and presumably dejectional] infection were striking. In one group 8 households or 10 per cent. of the group were responsible for 47 per cent. of the ova. The ordinary vermifuge for adults was carbon tetrachloride 2 cc. and oil of chenopodium 1 cc. Re-counts were made 2 to 4 weeks later and in 37 of 157 cases higher counts than before were then obtained. It is considered that the dry weather conditions which held would keep down infection, so that many treatments must have been taken improperly or not at all; [which conclusion, it may be noted, assumes that the counting technique was adequate and the privies, natural or artificial, used were dry spots]. It is pointed out that the counting methods of Caldwell and Stoll take up too much time for general use in field work and that some sufficiently accurate method is required for estimating the number of eggs present.

C. L.

CORDES (Wilhelm). **The Clinical Importance of Hookworm Infestation among the Population of the Preston Division, Oriente, Cuba.**—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 81-84. [5 refs.] [United Fruit Company Hosp., Preston, Cuba.]

"Hookworm incidence among the population of Preston Division is low. It is probable that less than 10 per cent. of the laboring class are infested; and the great majority of these carriers show no symptoms of suffering from harboring the parasites. Only occasionally is an actual case of hookworm disease observed, which manifests itself by a Stoll count of more than 10,000 eggs per cc. of formed stool.

"Patients showing 2,000 to 10,000 eggs require attention and specific treatment.

"Cases with egg counts up to 2,000 are clinically negligible, unless hookworm is associated with other anemia-producing diseases and faulty nutrition. A period of hookworm treatment of such individuals is often indicated; but one should not cling to the belief that he has thereby gotten to the root of the evil.

"To paraphrase Manson-Bahr's metaphor: hookworm may be the straw that breaks the camel's back, but yet, it remains a straw. Far more important is it to relieve the patient from his other burden—i.e., to teach him the measures for the prevention of hookworm infestation and the principles of a well balanced diet" [and yet the straw does break his back].

C. L.

OTTO (G. F.) & CORT (W. W.). **The Present Status of Hookworm in the South.**—*Jl. Amer. Med. Assoc.* 1931. July 11. Vol. 97. No. 2. pp. 92-93. [8 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The authors support STILES's conclusions (this *Bulletin*, Vol. 28, p. 228) that hookworm disease is still widespread in the southern part of the United States, particular areas being cited. It is held that the time has come when an attempt should be made, by *new* methods of study, particularly by the dilution egg counting [which in 1897 led Looss to the skin infection route of hookworms] and by Baermann's apparatus to evaluate the progress of the last 20 years and form a real scientific basis for future work.*

C. L.

PAYNE (George C.) & PAYNE (Florence K.). **Observations on Rate of Loss of *Necator americanus*.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 149-155. [6 refs.]

The authors point out that the rate of loss of hookworms, as indicated by CHANDLER's egg counts on prisoners admitted to a Calcutta jail (this *Bulletin*, Vol. 23, p. 773) amounts in three months to 500 for every 1,000 worms harboured or if the loss is uniform, 40 per 1,000 per week. Two cases were admitted to hospital having, as anthelmintics later proved, known hookworm populations of 1218 and 3033, were egg counted daily by Stoll's original method with allowance as he advised for stool consistency, and every stool examined personally by the authors for worms. A third patient was investigated out of hospital who carried on his normal work but came, not quite regularly, to pass stools in hospital for like examination. The recovery of worms from the stools over the observation periods was 15; by Chandler's curves it should have been 570. Nor do the egg counts, which in these heavy infections must have been nearly accurately measured, suggest any loss of worms. It is pointed out that except for the administration of treatments these persons suffered no change in environment calculated to influence the loss of worms.

C. L.

* Italics not in original.

ROTTER (Werner). Ueber die histologischen Veränderungen des Dünndarms bei Ankylostomiasis. [**Histological Changes in the Small Intestine in Ankylostomiasis.**]—*Virchows Arch. f. Path. Anat. u. Physiol.* 1931. Apr. 23. Vol. 280. No. 3. pp. 587–594. With 8 figs. [San Juan de Dios Hosp., San José, Costa Rica.]

Writing from San José, Costa Rica, Rotter reports that in almost all chronic cases of ankylostomiasis there are changes in the small intestine: punctiform haemorrhages in the mucosa, and larger ones in the submucosa, going on to thickening, granulation tissue and necrosis. There is also loss of epithelium and necrosis of the underlying connective tissue at the site of bites.

C. L.

MCCOY (O. R.). **The Egg Production of Two Physiological Strains of the Dog Hookworm, *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 194–202. With 1 graph in text. [11 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The writer's conclusions are:—

"1. The egg production of a cat strain of *Ancylostoma caninum* in cats was approximately 2,350 eggs per day per female as compared with the normal egg production of 16,000 eggs per day per female by a dog strain of *A. caninum* in dogs.

"2. The dog strain when introduced into cats produced an average of only 2,340 eggs per day, approximately the same number as did the cat strain. Infections of the dog strain in the cat, however, were of shorter duration than those of the cat strain.

"3. When infections of the cat strain were established in dogs, the egg production averaged 11,600 eggs per day per female.

"4. Apparently egg production is controlled by the host and is not inherent in the strain of worms."

[Control by the host species is evidently intended. Possible control of oviposition by the individual host within the species has not hitherto been considered in converting egg counts to worm loads.]

C. L.

OKADA (Ryoichi). **Experimental Studies on the Oral and Percutaneous Infection of *Ancylostoma caninum*. (First Report.) Rate of Primary Infection, Reinfection and Superinfection in Normal Host, Dog.**—*Japanese Jl. Experim. Med.* 1931. June 20. Vol. 9. No. 3. pp. 209–222. (Second Report.) **Destiny of Mature Larvae of *Ancylostoma caninum* infected Orally and Percutaneously.** pp. 223–235. (Third Report.) pp. 237–267. (Fourth Report.) pp. 269–280. [Govt. Inst. for Infectious Diseases, Imperial Univ., Tokyo.]

i. Primary oral infection with 100 infective larvae of *A. caninum* resulted in an average infection with 70 worms in pups, 50 worms in adult dogs, 20 in old ones. Similar reinfection after 8 to 25 days in pups resulted in an average infection of 66 worms, in adult dogs after 13 days of 31 worms. Results of "superinfection" are also given. [Here

too apparently there were two infections with 100 larvae each, so that the distinction between this and reinfection is not understood. Moreover the table shows the age of adult dogs as 1 and 2 days, so that the figures need not be given.]

ii. 30,000 infective larvae were fed to a pup and to an old dog and were applied to the skin of another pup. The table shows the number of larvae or young forms recovered from the faeces over the period of investigation and the numbers of grown forms in the gut when the hosts were forthwith killed. In these experiments the advantage to the worm of cutaneous infection is overwhelming.

Mode of Infection	Age	Period of Experiment in Days	Larvae found in Faeces	Larvae found in Gut of Killed Host
Oral	Pup	10	8,000	5,807
Oral	Grown Dog	20	2,600	157
Cutaneous ...	Pup	8	116	26,100

Moreover larvae passed *per anum* were still infective to pups, namely 60·3 per cent. of those passed by a pup and 12 per cent. of those passed by the grown dog.

iii. The results seem to be those reported by MIYAGAWA and OKADA [see below].

iv. Development up to 7 days was rather more rapid after cutaneous than oral infection ; after that no difference was detected.

Into a Vella fistula, an isolated loop of small intestine, 30 cm. long, 10,000 infective larvae of *A. caninum* were introduced. Its opening was plugged and bandaged to prevent licking and was washed through after 6 hours and thereafter daily till it died after 10 days. In the washings 613 larval or young worms were found, in the Vella fistula after death 351 worms and from the main intestine, which the worms must have reached after traversing liver and lungs, 6,917 worms. "Considering this fact, it is quite evident that the larval migration in the host's tissue, especially in the lungs, is a most significant act for their future development."

[Fülleborn's contrary conclusions accepted in this *Bulletin* Vol. 24, p. 540, merit reconsideration. He reported that he introduced into a Vella fistula 900 infective larvae of the dog necator *Uncinaria stenocephala* and plugged it, muzzling the dog. In fluid which trickled out when it was unplugged $\frac{1}{2}$ hour later, 3 larvae were found, but subsequently none. Hookworm eggs began to appear in the dog's faeces passed *per anum*, 21 days after infection, in 2 weeks reached a maximum of 1,300 per gram and had disappeared in 5 months. The fistula was washed through 21, 24, 29 and 45 days after the larvae had been introduced into it, but no hookworm eggs were ever found. There seems no explanation but that the infective larvae, except the 3 which were recovered from the fistula, entered its wall, and that all of them which reached maturity did so in the main gut after passing through the liver and lungs.]

C. L.

MIYAGAWA (Yoneji) & OKADA (Ryoichi). **Biological Significance of the Lung Journey of Ancylostoma Larvae in the Normal Host. (Second Report.)**—*Japanese Jl. Experim. Med.* 1931. June 20. Vol. 9. No. 3. pp. 151–207. With 16 figs. on 2 plates. [Govt. Inst. for Infectious Diseases, Imperial Univ., Tokyo.]

The paper begins with what is evidently an error since it corresponds neither with fact nor reason. "In our first report [this *Bulletin*, Vol. 28, p. 238] we gave out the following facts concerning the hookworm infection, that, even if the mature hookworm larvae infect the normal host, they are never able to develop to the adult stage." The present experiments indicate that mature larvae of *A. caninum* rarely develop in the rabbit to the extent of producing the primitive oral capsule, but that they are more likely to do so if they have spent even two hours in a pup or even been placed in saline emulsion of its tissues—skin, lung, stomach or intestinal wall, or in its natural gastric juice.

C. L.

McCoy (O. R.). **Immunity Reactions of the Dog against Hookworm (*Ancylostoma caninum*) under Conditions of Repeated Infection.**—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 268–303. With 7 graphs in text. [19 refs.] [School of Med. & Dentistry, Univ., Rochester, N.Y.]

The method employed was to feed dogs or cats with a known number of infective larvae of *A. caninum* enclosed in a double gelatine capsule, and after 2 or 3 weeks to enumerate twice weekly by Stoll's method the eggs found in a known fraction of the total amount of faeces which had been passed since the last counting. The faeces had been kept in "tightly sealed jars," and in a refrigerator overnight in warm weather. By dividing by the number of days concerned, the egg numbers were expressed as eggs per day, a procedure which eliminated day to day variations. At least 2 counts were made from each specimen. As a rule larvae were fed to dogs in increasing doses at weekly intervals up to about the 19th week, and then in large doses (10,000 to 15,000) with a 4-weeks' pause. Taking 4 pairs of dogs, each pair from one litter, the variations between maximum egg counts were almost as 11 to 18, 11 to 33, 14 to 53, and 32 to 33; so that counts might be almost equal in corresponding pairs or one specimen might give nearly 4 times as many eggs as its pair. In two instances a third pup was taken from two of the litters, and brought into the experiments later—on the 19th and 25th weeks respectively. The newcomer started with the large dose which its mates were at that date receiving. In neither of the newcomers did the number of eggs passed later exceed that passed by at least one of its previously and regularly infected litter-mates of the same age. In another experiment of the same kind, two dogs, first infected 6 and 16 weeks after their fellows, produced an egg peak about twice as great as the first dog did at the same period.

Part of McCoy's conclusions are that in 6 cases of heavy infection egg counts reached a peak of several million eggs daily during the first 3 months, with haemoglobin dropping to 25. Two dogs died. In the four survivors the egg count suddenly dropped in spite of heavy doses of larvae, with passage of large numbers of adult worms and a rise in haemoglobin. Two dogs were reinfected but with even more rapid throwing off of infection. It is believed that in all cases even of light infection some immunity, not age immunity, was developed, but in no case was there natural disinfestation. In six cats, an increased

resistance apparently distinct from age resistance was believed to occur. An important practical point for those who believe or disbelieve that the worm load can be measured by egg counts is that in 10 of these resistant dogs the egg output was a third of the generally accepted normal figure.

C. L.

STUMBERG (John E.) & RODRÍGUEZ-MOLINA (Rafael). **Hypersensitive-ness to Hookworm Proteins in Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Sept. Vol. 7. No. 1. pp. 37-49. [10 refs.] [Johns Hopkins School of Hyg. & Public Health Baltimore, & School of Trop. Med., San Juan.]

It has not been found possible to write a clear abstract of this paper. Sixty persons of both sexes from four to sixty years of age were examined for reactions to antigens composed of dried *N. americanus*, *A. lumbricoides* and *Bact. coli* and apparently also to dried infective hookworm larvae. Whether they were all infected with either or both of the two nematode parasites seems nowhere stated. The amount of infection was measured by Stoll's method, two counts from 0.15 cc. of suspension on each occasion being made. [This technique could demonstrably not differentiate infected from not infected persons as seems essential to do in such an investigation as this.] An anthelmintic was given, but no attempt is mentioned to determine whether or not it was effective; and re-examination as to sensitiveness was made 5 months later, no steps being reported as taken to ascertain whether any and if so how much infection had been acquired meantime. The authors' conclusions, among others, are that there seems to be no definite relationship between a "positive wheal" and the presence of infection, and that an intradermal reaction is too variable to be used for diagnosis so far as it is based on the size of the wheal, and the size and presence of pseudopods, but that there is a possible quantitative relation between the duration of the wheal and infection.

C. L.

KITAMURA (K.). Experimentelle Dermatitis durch wiederholte Applikationen der Hakenwurmlarven auf die Haut. [**Dermatitis produced by Repeated Application of Hookworms to the Skin.**]—*Japanese Jl. Dermat. & Urol.* June. 1931. Vol. 31. No. 6. pp. 866-883. With 2 figs. & 9 charts in text. [13 refs.] [In Japanese. German summary pp. 64-65.] [Dermato-Urol. Clinic, Med. Acad., Kumamoto.]

Local reaction of guineapig's skin to penetrating larvae of *A. caninum* becomes greater with repeated applications; a short interval increases the irritation. A local hypersensitiveness develops and is not usually lost, while the rest of the skin may react normally, or excessively, but never subnormally.

C. L.

EPSTEIN (C. I.). [**First Case of Ancylostomiasis in Astrakhan.**]—*Trop. Med. & Vet.* Moscow. 1930. Vol. 8. No. 10. pp. 48-50. [In Russian.]

The author records the first case of hookworm infection observed in Astrakhan. As the patient had lived in Persia and in Baku it was probably not of local origin.

C. A. Hoare.

SANDGROUND (J. H.). **Studies on the Life-History of *Ternidens deminutus*, a Nematode Parasite of Man, with Observations on its Incidence in Certain Regions of Southern Africa.**—*Ann. Trop. Med. & Parasit.* 1931. Aug. 13. Vol. 25. No. 2. pp. 147–184. With 2 plates. [17 refs.] [Harvard Med. School & Museum of Comparative Zoology, Harvard Univ., Boston.]

An important paper. While agreeing to the possibility that certain eggs already reported upon (this *Bulletin*, Vol. 27, p. 468) were those of trichostrongylus (they were in morula when passed in the faeces and had one pole more sharply rounded than the other), Sandground shows by recovery of worms after anthelmintics that *Ternidens deminutus* is a not uncommon parasite of man in certain areas of Southern Africa. The egg is regularly ellipsoidal with broadly rounded poles and perhaps with one side more flattened than the other; the average size of 100 was 84μ by 51μ and when passed they usually were 8-celled, but might have only 4 or 2 metamerous. From the uterine eggs of worms (expelled by anthelmintics) kept on the bench with a daily range in temperature between 13°C . and 30°C . there hatched in 40 to 48 hours a rhabditiform larva 0.3 to 0.36 mm. long having a flagellum-like tail 70μ long. The sheathed infective filariform larva is 0.63 to 0.73 mm. long. On drying, structure becomes almost unrecognizable, but on adding water larvae slowly revive, often losing the sheath in so doing, and appear then to be incapable of surviving a second drying. "From these observations it is apparent that in nature the larvae of *Ternidens* are well-equipped to withstand the frequently protracted periods of drought that is characteristic of their geographical environment." Infective larvae show the usual migratory instinct. Heat activates these larvae but little, their movements remaining very lethargic; this absence of activation being designated absence of positive thermotropism. It is held that this explains the poor isolation of larvae which was obtained by Baermann's apparatus. Penetration of skin was poor if it existed at all, eleven and nine of 12 larvae placed on it in each of two experiments being recovered, and no signs of infection appearing afterwards.

The eggs were found in 227 of 1,294 examinations by Willis's technique, the numbers varying from 0 in 54 at Livingstone, N. Rhodesia and 1 in 323 at Lourenço Marques to 59 per cent. of 190 examined at Mount Selinda (S. Rhodesia, Lat. 20°S . and close to the border of Portuguese E. Africa), 65 per cent. of 100 at Chikore 18 miles from Selinda, and 27.5 per cent. at Gogoyo in Portuguese East Africa, 40 miles from Mount Selinda. No *Ternidens* were found in local *Cercopithecus* or baboon, nor was infection produced in a young baboon by feeding it with infective larvae. Expulsion of worms from persons in whom the eggs were detected was aimed at by administration of carbon tetrachloride or tetrachlorethylene in doses of 3 to 5 cc. with or without 1 cc. of oil of chenopodium. From 15 cases in which the *Ternidens* passed were counted, an average of 17 worms was passed, the maximum being 103 at Chikore, and in no case were signs of disease detected. Whether recovered after treatment or at autopsy the worms always contained blood. They inhabit the large intestine. A few autopsies, carried out in trying and unsatisfactory circumstances, revealed no acute or extensive pathology, and in only one case were large cystic nodules found. No lowering of haemoglobin was detected in any case.

C. L.

FAUST (Ernest Carroll). **Human Strongyloidiasis in Panama.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 203-211. With 2 figs. [11 refs.]

In addition to the conclusions reached in an earlier report (this *Bulletin*, Vol. 28, p. 689) some striking results have been obtained with gentian violet, one grain three times a day in "enteric-coated" tablets. The infection then becomes of the direct type only, while in investigations on monkeys the female worms, it is noted, are killed *in situ* and evacuated in the faeces, the viability of already hatched larvae being unaffected.

C. L.

FAUST (Ernest Carroll). **Infection Experiments in Monkeys with Human, Macaque and Ateles Strains of Strongyloides.**—*Proc. Soc. Experim. Biol. & Med.* 1931. June. Vol. 28. No. 9. pp. 919-920. [Dept. of Trop. Med., Tulane Univ., New Orleans.]

"The evidence obtained from this series of experiments points to the conclusion that the *rhesus* and *red-spider* strains of *Strongyloides* are physiologically different species: they are easily inoculable into their natural hosts from which they were obtained, but they are unable to establish intestinal infections in the reciprocal hosts, although there is some evidence that they migrate through the tissues of the inappropriate host. The human strain can be established but is not able to maintain itself in the red spider monkey; in the rhesus monkey it appears to be completely abortive."

C. L.

FRÖES (Heitor P.). **Some Points of Interest in the Biology of *Strongyloides stercoralis*.**—*Jl. Trop. Med. & Hyg.* 1931. Aug. 1. Vol. 34. No. 15. pp. 238-239. With 1 text fig. [8 refs.]

Fröes, reverting to a case already reported (this *Bulletin*, Vol. 27, p. 468) has a useful note, with references to the finding of larvae in the circulating blood, urine, sputum and vomit.

C. L.

MCCOY (O. R.). **Immunity of Rats to Reinfection with *Trichinella spiralis*.**—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 484-494. [3 refs.] [School of Med. & Dentistry, Univ., Rochester, N.Y.]

Larvae in rats were enumerated by dilution after being obtained by digestion as follows. The digesting fluid contained 0.5 per cent. of hydrochloric acid and 1 per cent. of pepsin, which while destroying non-encysted larvae is believed not to incommode encysted ones; that is those 28 or more days old. The animal was skinned and eviscerated, the carcase put through a mincing machine, and added to the digesting fluid in the proportion of 40 gm. to the litre. The brew was left at 37° C. for 3 to 5 hours while a mechanical stirrer was in constant action, and was then strained into a funnel; the clamp on the rubber tube below was opened an hour later, and 100 to 200 cc. of larva-containing fluid drawn off. After washing the larvae several times, an evened suspension of them was several times sampled by spreading 0.075 cc. in a thin line along a slide and counting the larvae: a known number of larvae so determined was then injected by tube into the stomachs of rats at weekly intervals, the actual numbers being two feedings of each denomination of 500, 1,000, 2,000, 4,000, and 8,000, or a total of 31,000

larvae. Eleven such rats and eleven controls from the same two batches (3 and 8 from each respectively) were then fed three weeks later at one intubation with a test dose of 70 larvae per gram, implying 12,000 to 23,000 larvae to each rat. Of the 11 controls 9 died, while two survived and took two months to recover from a very grave illness. All but one of the 11 previously infected rats survived, the exception dying on the 5th day from extensive thrombosis of the mesenteric veins. To three of these last-mentioned surviving rats a second test dose of the same size was given and they were killed in 3 to 4 days to determine to what extent the adult worms developed in the intestine; it proved to be 0·04, 0·05 and 2·8 per cent. To three hitherto uninfected controls the same doses were given and the percentage of adults found in the intestine in 3, 4 and 15 days was 35, 28·7 and 35·2. Moreover from the muscles of the previously infected rats which survived the first test dose there were recovered 8,400, 1,950, and 1,750 larvae; these figures are in contrast to those of the two control rats out of 11, which survived the first test feeding and received no other; for on killing them their muscles yielded 570,000 and 535,000 larvae, while a third member of that batch which died on the 32nd day showed 1,527,000. Other shorter experiments point to the same acquisition of immunity.

C. L.

HICKLING (R. A.). **Oedema round the Eyes caused by *Trichina spiralis*.**—*Brit. Med. Jl.* 1931. Oct. 10. p. 654. With 1 chart in text.

Periocular oedema without albuminuria or raised blood pressure and with normal fundi caused a provisional diagnosis of trichinosis. There was no eosinophilia. Four days after the appearance of oedema a nine days fever began with vomiting twice. Eosinophilia was present on the eleventh day of illness and on the 16th day excision of a piece of trapezius muscle showed encysted larvae of *Trichinella spiralis*. The woman, aged 25, lived in London and had never been abroad.

C. L.

BRULÉ. Deux cas d'ictère hémolytique à trichocéphales. [**Two Cases of Haemolytic Icterus with Presence of Trichuris.**]—*Bull. et Mém. Soc. Méd. Hôpît. de Paris*. 1931. June 8. Year 47. 3rd Ser. No. 19. pp. 960–965.

Two cases are reported. One had in seven years 5 acute attacks of anaemia with subicteric tinge. Many trichuris eggs were found, and 6 gm. [grains 90] of thymol given every 3 weeks left a few only after 4 months of treatments. Anthelmintic and iron treatments were continued, and he is now well, 9 years later, though the presence or absence of trichuris seems unknown. The other patient too had many trichuris eggs, was treated with liver and twice with two treatments of 1·5 cc. of oil of chenopodium. After this no eggs were found, but since there were relapses of his general condition chenopodium was repeated. A slight urobilinuria persists.

C. L.

SHORB (Doys Andrew). **Experimental Infestation of White Rats with *Hepaticola hepatica*.**—*Jl. Parasitology*. 1931. Mar. Vol. 17. No. 3. pp. 151–154. [8 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

"Of seventy-one wild rats obtained in and around Baltimore, 47·9 per cent. were infected with *H. hepatica*. Six white rats fed on the infected

livers of these wild rats did not develop the infestation, but the eggs passed through the intestine unchanged. These eggs were recovered from the feces and became embryonated in twenty-five to forty-two days at 30° C. Fifteen white rats became infected when fed on these embryonated eggs, while eggs in pieces of the rats' livers but not passed through an animal, were developed only to the early morula stage in forty-two days. Eggs from infected livers fed to a cat also developed vermiform embryos in thirty days."

C. L.

MACARTHUR (W. P.). **Pruritus Ani.**—*Brit. Med. Jl.* 1931. Aug. 22. pp. 334-336.

It is not possible to condense this tightly-packed mass of information on a most irritating subject. Here is one point only. The treatment advised is the injection of 4 ounces of salt solution with a strength of two tablespoonfuls to the pint, which must be self administered since it is useless unless given when there is itching, that is shortly after going to bed when the female worms come down to the anus to oviposit. "When a sufferer who has been wakened nightly for months or years finds that a simple procedure completed within a very few minutes will protect him from the tortures of pruritus, at once his whole outlook on life is altered," and such pruritus has been ended by the capture of a single worm. A pharisaical scrupulosity in washing is an added guard against reinfection.

C. L.

PETROVYCH (A.). Zur Frage ueber einige Ursachen der Invasion und Reinvansion bei Enterobiosis. [**On the Causes of Invasion and Re-invasion by Thread Worms.**].—*Muench. Med. Woch.* 1931. Apr. 17. Vol. 78. No. 16. pp. 663-664. [6 refs.]

It is concluded that for a diagnosis of oxyuris infection, there must be examined not only scrapings from perianal fissures and from beneath the nails, but also the duodenum; that the possibility of air convection must be dealt with by cleansing the bowel, the wearing of closed up night clothes and treatment of throat and nose; and that diffusion through communities must be prevented by close search for carriers.

C. L.

HOFFMAN (W. A.). **Gapeworm in Man.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 381-383. With 1 plate. [9 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

This comprises the fourth case of Syngamus infection in man, first described by LEIPER in 1913; the parasite was finally identified by him as probably being *S. laryngeus* (this *Bulletin*, Vol. 22, p. 94), a widespread parasite of ruminants. In this case a more or less continuous cough coming on several weeks after visiting a farm led to the seeing of a red object on the posterior wall of the pharynx and its removal by forceps, when it proved to be a pair of worms *in copula*.

C. L.

ESPIÉ (A.). Note complémentaire sur un nouveau parasite intestinal humain de la Tunisie. [**Further Note on a New Human Intestinal Parasite in Tunisia.**—*Arch. Inst. Pasteur de Tunis*. 1931. Apr. Vol. 20. No. 1. pp. 73-76. [1 ref.]

Espié returns to his previous report (this *Bulletin*, Vol. 24, p. 190). The technique is merely described as concentration after disintegration. Eggs corresponding to the trichostrongylus character were found in 123 of 1,100 examinations of different persons, but only in 15 were they unaccompanied by other helminth eggs. They were not, it is pointed out, eggs of *Heterodera* or *Tyroglyphus*. No adults were ever recovered. Culture was carried through in plain faeces till eggs became embryonated, after which the material was described as having reached its limit of preservation.

C. L.

NISHIMURA (Fukutaro). **On the Histological Changes in the Tissues of the Final Host, caused by the Progressive Development of *Gongylonema orientalis*.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1931. June. Vol. 30. No. 6 (315). pp. 633-646. With 16 figs. on 2 plates. [127 refs.] [In Japanese. English summary pp. 46-48.]

The author reaches these conclusions :

"The presence of the live parasite produces three different reactions in the surrounding tissues : (1) The circumstance that the parasite lives completely embedded in the epithelial stratum insures the thorough distribution of its secretions and excretions throughout the mucosa, and also causes injuries of a mechanical nature, and thus stimulates the regenerative proliferation of the epithelium. (2) The metabolic products of the parasite and especially the secretion of the cervical gland cause engorgement of the viscus and inflammation of the mucosa, and thus stimulate proliferation of the connective tissue. (3) The secretion of the cephalic gland of the female stimulates proliferation of the mucosa epithelium and is the agent for canceration."

C. L.

FÜLLEBORN (F.). Eine seit 24 Jahren an der Vorderseite einer Hand umherwandernde Hautaffektion aus Ostafrika. [**A Wandering Eruption on the Hand of 24 Years Duration.**—*Dermat. Woch.* 1931. July 18. Vol. 93. No. 29. pp. 1163-1167. With 4 text figs. [7 refs.] [*Inst. for Ship & Trop. Diseases, Hamburg.*]

Continuing his account of this curious case (this *Bulletin*, Vol. 24, p. 450), Fülleborn illustrates the points on the hand where this eruption has appeared during 1929 and 1930. He holds as before that it is probably caused by a wandering nematode larva. It has persisted for 24 years.

C. L.

GRACE (A. W.) & GRACE (Feiga Berman). **Researches in British Guiana 1926-1928 on the Bacterial Complications of Filariasis and the Endemic Nephritis, with a Chapter on Epidemic Abscess and Cellulitis in St. Kitts, British West Indies.**—No. 3 of the *Memoir Series of the London School of Hygiene & Tropical Medicine*. 1931. Mar. pp. viii+75. With 4 text figs. & 2 charts. [28 refs.] London : School of Hygiene & Tropical Medicine, Keppel Street, Gower Street, W.C.1. [8s.]

In this monograph on the bacterial complications of filariasis there are matters of helminthological interest. It is noted that in filariasis

the lymphangitic attacks have a common character; that when repeated in the same patient they usually arise in the same situation; that when in the cases observed an abscess resulted from lymphangitis the β haemolytic streptococcus was recovered from this in 26 of 27 cases, that in 5 of these 26 cases the same micro-organism was recovered from the blood, was the only one so recovered, and was present also in one case of "abdominal filariasis"; and that *F. bancrofti* has not been shown capable of producing lymphangitis. Passing to elephantiasis, this condition may begin apart from lymphangitis in about 10 per cent. of cases; it may follow simple lymphangitis, but most commonly it follows abscess usually of unknown origin and less usually traumatic.

Of 1,000 in-patients at the Georgetown hospital 23.1 per cent. showed *Mf. bancrofti* in blood drawn between 8 p.m. and midnight, for those over 10 years of age the percentage was 25, for those under 10 it was 6.4, for East Indians 14.3, for those with elephantiasis 14.9. Percentages of some other manifestations were: enlarged glands along Poupart's ligament 54.2, in Scarpa's triangle 26.3, epitrochlear 16.8, axillary 15.3, elephantiasis 11.4, hydrocele 12.3 of males, abscess 1.1, chyluria 0.4, enlarged lymph trunks 0, lymphangiovarix of scrotum 0, chylocele 0. In children under 10, not only is the microfilaria rate low but streptococcal lymphangitis and abscess are rare, but in East Indians the low microfilaria rate is combined with a streptococcus rate as high as that of other races. Moreover there is no relation between the presence of embryos in the blood and a positive reaction to streptococcus toxin.

Two points are further discussed: (1) hard painful lumps of walnut size are found along lymphatic trunks and associated with lymphangitis [apparently the "focal spots" of O'CONNOR, GOLDEN and AUCHINCLOSS, this *Bulletin*, Vol. 27, p. 986] and are explained as due to aggregations of streptococci; (2) these disappear as elephantiasis supervenes, which occurs uniformly about two years after the initial happening, and the process is explained as the substitution, for the aggregations, of an innumerable number of minute foci, each containing a few organisms. "There is no direct evidence of the part played by *Filaria bancrofti* in the origin of elephantiasis in British Guiana." In those in whom lymphangitic attacks have failed for a year or more the microfilaria rate is half that shown by those still experiencing these attacks.

"Three therapeutic agents were investigated, viz., a eucalyptus and bicarbonate mixture, mercurochrome—220—soluble, and antistreptococcal serum. The mixture was of no value and the mercurochrome little better. There is some evidence to show that antistreptococcal serum has a place in the treatment of lymphangitis."

C. L.

MCKINLEY (Earl B.). **The Role of Bacteria in Acute Filarial Lymphangitis.**—*Porto Rico J. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 419–427. [9 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

After pointing out that from work done by others there is abundant evidence that bacterial infection may complicate filarial disease,

McKinley asks "Can we have acute filarial lymphangitis *without* bacterial infection" and if so how? He has studied 47 cases selected by O'CONNOR or SUAREZ, of which 9 were deliberately included as non-filarial controls. The author's own summary is as follows:—

"Thirty-eight cases of acute filarial lymphangitis have been studied bacteriologically under the most careful conditions of asepsis. Blood cultures have been uniformly negative. Cultures from focal areas of pain and inflammation by aspiration in twenty-seven cases have been negative. In cultures prepared from skin removed from the inflamed areas of eleven cases one culture was positive for a green-producing streptococcus, another showed a hemolytic staphylococcus aureus and a third was contaminated with a gram-positive bacillus. In no case was a *Streptococcus hemolyticus* cultivated. In nine control cases, simulating acute filarial lymphangitis in some respects but definitely diagnosed as septic, the *Streptococcus hemolyticus* was isolated in seven and *Staphylococcus aureus hemolyticus* was cultured in two cases.

"We believe that the almost uniform absence of positive cultures in this series of cases of acute filarial lymphangitis, studied under such rigid aseptic technique, indicates that bacterial invasion does not always or even generally account for the acute manifestations of this condition. The results suggest that there may exist at least three types of acute lymphangitis: (1) lymphangitis of bacterial origin, (2) lymphangitis of filarial origin and (3) filarial lymphangitis with secondary bacterial infection. The epidemiological, histological and bacteriological evidence suggests that acute filarial lymphangitis may commonly exist as a disease entity without a complicating secondary bacterial infection. It becomes then a clinical problem to differentiate these conditions one from the other. The mechanism by which the filarial process produces these acute attacks of lymphangitis without the intervention of other infections is still unknown. The periodicity of recurrent attacks in many cases is suggestive that the phenomenon is in some way related to the life cycle of the parasite in the human host, but this is mere speculation. Toxins of living, dying or dead worms, allergic phenomena or periodic invasion of worms into new and unprotected tissue (by fibrotic changes) where toxic products of the worms may be absorbed by the body have all been suggested. The problem still remains unsolved and requires further investigation."

C. L.

Low (G. Carmichael). **Some Points in the Pathology of Filariasis: *Filaria bancrofti*, *Loa loa* and *Onchocerca volvulus* Infections.**—*Jl. State Med.* 1931. Oct. Vol. 39. No. 10. pp. 594-598. [11 refs.]

Dealing in a paper read at the Frankfurt Congress with *F. bancrofti* infections, Low first concurs with ACTON and RAO [this *Bulletin*, Vol. 28, p. 682] and suggests that all tropical workers who have a personal knowledge of the subject, now agree that the lesions produced by *F. bancrofti* are in part caused by toxins given off from the worms plus superimposed bacterial infection. He gives instances other than those cited by LANE of the finding shortly after death of preponderating numbers of microfilariae in the blood of the heart and thoracic viscera of man and animals. He holds that there is no doubt about there being a seat of special selection for such microfilariae in the blood of the thoracic viscera.

C. L.

TAMPI (M. K.). **A Study of Filariasis in Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 435-441. [School of Trop. Med., Univ. of Porto Rico, San Juan, & School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Of 518 persons examined at Santurce, Porto Rico, 7·7 per cent. showed *Mf. bancrofti*. Only *Culex quinquefasciatus* (*fatigans*) was found infected, in 5·4 per cent. of 543 specimens. The highest microfilaria rate was 9·5 in the Boys' Charity School, the rate increasing with length of residence; and here the percentage of infected *Culex* was 7·4, and there existed excellent local arrangements round it for their free breeding. The localization of filarial endemicity in the island is stressed, but the suffering, incapacity, lowered vitality and serious economic loss it causes are pointed out.

C. L.

FENG (Lan-Chou). *Anopheles hyrcanus* var. *sinensis* Wied., **Transmitter of Wuchereria (Filaria) bancrofti in Woosung District, Shanghai, China.**—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 502-514. With 13 figs. on 1 plate & 1 map. [13 refs.] [Peiping Union Med. College, Peking.]

In and about Woosung filariasis and elephantiasis are common. Of wild *Anopheles hyrcanus sinensis* 16 per cent. contained filarial larvae, while in 16 per cent. of the infected mosquitoes the larvae were infective; this is the mosquito found commonly in the villages. Of wild *Culex pipiens pallens* 13 per cent. harboured filarial larvae but none were in the infective stage; it is essentially a pest of the town. In the villages the dwelling places of 33 per cent. of families harboured filarially infected mosquitoes and in the town 9 per cent. The evidence, then, is that *A. hyrcanus sinensis* is a good and presumably the main carrier here and probably throughout the Yangtze valley. Only young larvae have been found in *Culex tritaeniorhynchus*, *Armigeres obturbans* and *Aedes albopictus*.

C. L.

BRUG (S. L.). Filariasis in Nederlandsch-Indië, III.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Mar. 1. Vol. 71. No. 3. pp. 210-239. With 3 charts (2 on folding plates). English summary p. 240. [30 refs.]

——. **Filariasis in the Dutch East Indies.**—*Proc. Roy. Soc. Med.* 1931. Apr. Vol. 24. No. 6. pp. 663-673 (Sect. Trop. Dis. & Parasit. pp. 23-33). With 4 figs., 1 diagram & 1 map. [15 refs.] [Med. Lab., Batavia, Java.]

These papers cover much the same ground and follow up previous publications (this *Bulletin*, Vol. 26, p. 546). The distributions of *Mf. bancrofti* and *Mf. malayi* in the Dutch East Indies are traced, but it is particularly noted that where mixed infections occurred they were not proportionate to the number of single infections: thus, in Moekoe Saki, of 115 persons examined 64 had no infection, 46 harboured *Mf. bancrofti* only and 5 harboured both microfilariae; there was no pure infection with *Mf. malayi*. It is held that this discrepancy cannot be explained by supposing that they are two forms of the same

species for if so the new form would have been noted before, and it is concluded that individual hosts must have varying immunity to the two species.

Regarding the larval host, in a certain locality 47 per cent. of the population harboured *Mf. malayi* but *Culex fatigans* was absent from thousands of mosquitoes caught in houses there. Five catchers were kept fully occupied in capturing during one evening the hundreds of mosquitoes which fed on a single heavily infected patient. During the next 10 to 15 days about 90 per cent. of these mosquitoes died. *Taeniorhynchus* (*Mansonioides*) *annulatus* and *T. (M.) annulipes* were by far the commonest local mosquitoes, while in addition the survival of filariae occurred practically only in them, though a few survived in *T. (M.) uniformis* and *T. (M.) annuliferus*. Of mosquitoes caught in houses, only the two first-named species were found infected—to 1.9 and 1.2 per cent. "The prevalence of mosquitoes is great enough to explain why half the population was infected. It would be far more difficult to explain why the other half was not." In spite of their overwhelming numbers, their breeding places were not discovered in a 14 days' search. In the mosquito, development of *F. malayi* closely follows the lines described for *F. bancrofti* except perhaps in two features. In the sausage stage, which lasts about 5 days the tail with its scattered nuclei is usually preserved; in the 7 to 10 days' stage, a nail-like structure fills the anus.

Periodicity of *Mf. malayi* was in the mean between 1 to 15 and 1 to 20, taking noon and night numbers, as compared with more than 1 to 100 for *Mf. bancrofti*. It was reversed in a night worker. In New Guinea, cases of non-periodic infection with *Mf. bancrofti* were found. With *Mf. malayi* infection, elephantiasis occurred mainly in the limbs and those with elephantiasis showed microfilariae more often than those without. With *Mf. bancrofti* infection, the genitalia were mainly infected. Brug adds, "the atypical form of *mf. malayi* of Korke is the same as *mf. malayi*."

C. L.

LANE (Clayton). **The Mechanism of Microfilarial Periodicity.**—*Lancet*. 1931. May 16. pp. 1100–1101. [6 refs.]

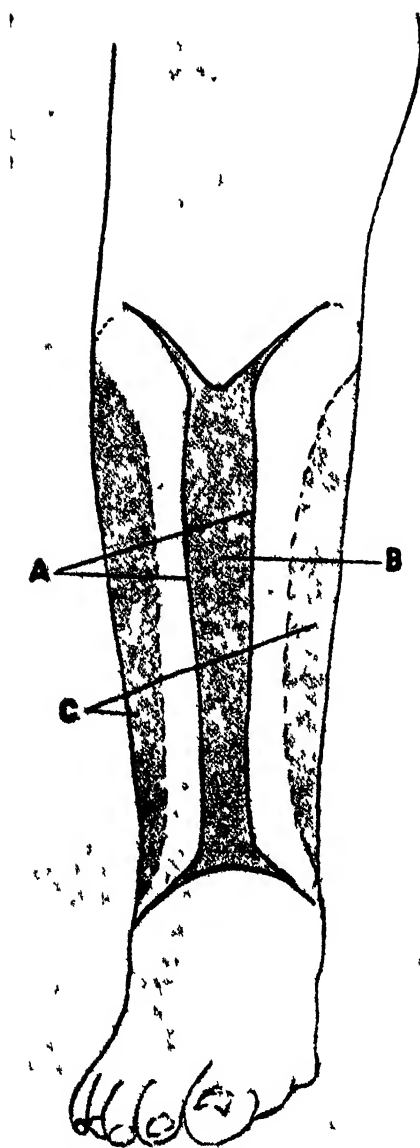
In a former paper (this *Bulletin*, Vol. 26, p. 981) the writer, by exclusion of other possible causes, was led to conclude that the mechanism of microfilarial periodicity could reasonably be explained only by cyclical parturition of female worms and daily death of embryos. Fresh work seeming to justify a return to the matter, he now first explains that by mechanism he meant mechanism—the mechanical means by which periodicity is produced. The stimulus which sets the mechanism in motion was and is deliberately excluded from consideration. He deals with the statement by MANSON-BAHR (*loc. cit.*) that in the periodic form of infection by *F. bancrofti* the adults maintain a central, in the non-periodic a peripheral, habitat, and with certain difficulties raised by that critic. Lane points out how the work of O'CONNOR, GOLDEN, and AUCHINCLOSS has since shown (this *Bulletin*, Vol. 27, p. 986), first that the former statement can no longer be accepted, since worms may be widely scattered in the limbs in this form of filariasis, and second that the number of fecund and mature *F. bancrofti* present in a filariated individual may far exceed the suggested figure of 20, as follows from

the fact that they have now been found in large numbers in habitats whose search has hitherto been neglected, namely the lymphatics of the limbs. Accordingly the calculated daily fecundity of individual female worms must be far lower than the huge figure to which MANSON-BAHR's figures led him. He quotes MANSON-BAHR's experience that microfilariae are usually dead in chylous urine, but alive at night in haemochylous urine, and points out that it suggests, or implies, that urine itself is not deadly to them but that they are usually dead in it because their life span has so often been passed before they reach it through tortuous blocked lymphatics. What, he asks, is the usual finding here? He cites the new evidence produced by O'CONNOR (this *Bulletin*, Vol. 28, p. 681), for cyclical parturition, as well as a second case privately communicated in which O'CONNOR found in Porto Rico, where nocturnal periodicity holds, four fully developed gravid female worms all at the same stage of parturition. He further asks whether this is normal in lands where periodicity is present and abnormal where it is absent. Finally he points out that with adults of this species so common in parts of the body distal to all lymph glands, the destruction of microfilariae in the glands implicated, and the fibrosis which presumably follows, must in future be considered in any attempt to explain this production of elephantiasis in filarial infection.

C. L.

- i. AUCHINCLOSS (Hugh). **A New Operation for Elephantiasis.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1930. Dec. Vol. 6. No. 2. pp. 149–150. With 4 plates. [College of Physicians & Surgeons, Columbia Univ., New York City.]
- ii. TORGERSON (William R.). **Preliminary Report on the Auchincloss Operation for Elephantiasis.**—*Ibid.* 1931. June. Vol. 6. No. 4. pp. 411–418. With 22 figs. on 15 plates. [6 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]
- iii. DEL TORO (Jorge), PONS (Juan A.) & RODRÍGUEZ MOLINA (R.). **Case Report on Twelve Auchincloss or Modified Auchincloss Operations for Filariasis. Preliminary Report.**—*Ibid.* 1931. Sept. Vol. 7. No. 1. pp. 3–10. With 18 plates. [2 refs.] [Univ. Hosp., School of Trop. Med., Univ. of Porto Rico, San Juan.]

i. The Auchincloss operation is intended to lighten elephantoid legs, and to remove those tender focal spots whence start the inflammatory lesions of filarial fever and as many calcified worms as possible. It consists in two incisions marking out a vertical strip of skin. From its ends V-shaped incisions are made diverging upwards at the upper end and downwards at the lower. "An almost dangerously wide amount of skin was then undermined with considerable care just deep to what might be considered the corium . . . over one half—nearly two-thirds—of the . . . leg was thus exposed. Except for the annular ligament of the ankle, the fascia covering the bone and the muscles was then removed with the subcutaneous tissue and the strip of skin *en masse*." With the leg elevated the skin was approximated with care. In this case it nowhere sloughed. Figures show a diagram of the operation, photos of the legs before and after, and an X-ray photo of the excised skin in which a surprisingly larger number of



Scheme of the Auchincloss operation for elephantiasis.

A Incisions B Skin excised C To show extent of subcutaneous tissue and deep fascial excision posteriorly This type of incision has been used posteriorly and is applicable to either side but, as yet, experience has not demonstrated which if any is preferable It has, so far, been placed so as to remove the maximum number of areas of demonstrable calcification It may be found necessary to use more than one incision in more than one operative stage

[Reproduced from the *Porto Rico Journal of Public Health and Tropical Medicine*]

calcified shadows was demonstrated than was shown in the leg before operation. This description applies to an operation where the vertical strip of skin removed was anterior, but it is contemplated that it should be situated where it will remove the largest number of calcified filariae as indicated by X-rays.

ii. Torgerson, reporting on 5 cases of the Auchincloss operation, notes that 3 or 4 years must pass before its value can be settled. Results have been best where fibrosis has been greatest giving an X-ray density of plus-three or plus-four; the patient should be in bed for at least ten days before operation and there must be no ulceration of the skin—for in one case in which an ulcer was cut out, with great care and separate instruments, there was yet necrosis which involved a considerable area of skin and also the tibialis anticus tendon. He is convinced that the flaps are in no danger provided a fourth to three-eighths of an inch of subcutaneous tissue is left with the skin.

iii. The Kondoleon operation, it is pointed out, aims at draining the superficial lymphatics through the deep ones by leaving an open vent in the deep fascia, while the Auchincloss operation aims also at correcting deformity and removing adult filariae. As regards surgical details, great stress is laid on preliminary scrubbing and cleansing, and a prolonged period of rest before operation. During it, there are advised general anaesthesia, the tourniquet, suspension of the leg about 2 feet above the level of the operating table, the leaving of some subcutaneous fat adherent to the skin when marked fibrosis is not found near the latter, the leaving of strips of deep fascia to support the muscles, the lengthening of the vertical incision rather than the making of the oblique terminal ones of Auchincloss, and the excising of skin a short distance only ahead of the suturing, thus "fitting the new stocking to measure." Twelve cases are described in detail. Sometimes cosmetic results have been excellent, sometimes less so, and sometimes swelling about the ankle has increased. In two cases there have been attacks of lymphangitis since the operation. The pathological lesions in the excised tissues have included in certain cases arterial sclerosis, thickening of the intima of small vessels to an extent which may occlude them, calcification of microfilariae, hypertrophy of wall of lymphatics. "It is too early to draw any conclusions on the results of the surgical treatment. . . . In the majority of cases treated by operation good results are late in coming."

[There is no mention in any of these papers of any immediate or late effects of that wide destruction of sensory nerves which must surely occur.]

C. L.

ROMITI (Cesare). Contributo al trattamento chirurgico della elefantiasi dello scroto. (Con la descrizione della tecnica personale di resezione plastica adottata.) [**Surgical Treatment of Elephantiasis of the Scrotum.**—Reprinted from *Rassegna Internazionale di Clin. e Terapia*. 1930. 24 pp. With 3 text figs. & 24 figs. on 2 folding plates. [10 refs.] English summary.

The author describes with a certain amount of detail and discusses the recognized methods of treatment of elephantiasis of the scrotum,

both operative and non-surgical. Among the latter he mentions injections of silver, arsenic, copper, mercury and antimony preparations to kill the *filaria*, and the use of vaccines and of fibrolysin; the former he divides into those aiming at lymph-drainage and those of excision and of a plastic nature. He next discusses the pathogeny of the condition which in his view is not a nosological entity *per se* but is largely secondary to pathological changes in the spermatic cord and epididymis, which are primarily affected. The testicle and the vas deferens are not subject to these lesions. The early manifestations consist, he states, of oedema of the ligamentum testis secondary to venous and lymph stasis of the vessels of the pampiniform plexus. In a great majority of cases the result of this is the formation of a hydrocele with a thickening of the tunica vaginalis and oedema of the areolar tissue of the cord. In support of this theory is the fact that the author has found in the lymphatic dilatations of the plexus of the cord, in the epididymis and in the hydrocele fluid living filariae and embryos. In further confirmation he states that in women elephantiasis of the labia majora is very exceptional (he himself has never seen a case) while at operations of laparotomy in the lower quadrant for various reasons he has frequently observed varicocele of the ovarian veins, dilatation of the ovarian lymphatics and oedema of the ovarian and broad ligaments. The technique of his own method of operation is then described, the removal *en bloc* of the diseased tissue followed by a plastic for the scrotum. The details cannot be given here, but the article is furnished with schematic drawings showing the incisions he makes and there are photographs of patients showing the condition before and after treatment. Brief notes are given of eight cases.

H. H. S.

AUBIN & NADESSIN. Traitement des lymphangites et des éléphantiasis par les injections de lipovaccin anti-streptococcique. [**Treatment of Lymphangitis and Elephantiasis by Injections of Anti-streptococcus Lipovaccine.**—*Rev. Méd. et Hyg. Trop.* 1931. Mar.-Apr. Vol. 23. No. 2. pp. 91-99.]

The cases number 16. It is claimed that a course of these injections produced rapid and complete betterment of lymphangitis, with fewer and less severe relapses, whether the condition was associated with filariasis or not. There has also been some shrinking of elephantoid swelling, and cessation of an existing lymphorrhoea.

C. L.

JANTZEN (Walther). **Microfilaria Nocturna—Case Report.**—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. p. 110. [Truxillo Railroad Company Hosp., Puerto Castilla, Honduras.]

A typical periodic case showing many microfilariae, especially between midnight and 4 a.m.; admitted for an accident; microfilariae discovered by routine examination; the man having no symptoms: the case being the first locally detected in a 6 years search. He had lived in Nicaragua and Costa Rica and had visited Panama.

C. L.

STRONG (Richard P.). **Onchocerca Investigations in Guatemala. Report of Progress of the Harvard Expedition.**—*New England Jl. of Med.* 1931. Apr. 30. Vol. 204. No. 18. pp. 916-920. [Dept. of Trop. Med., Harvard Univ., & Med. Dept., United Fruit Co., Boston.]

At Santa Emilia, Guatemala, 54 per cent. of inhabitants are infected with *O. caecutiens*, the tumours nearly always being situated on the head, usually on the scalp, measuring in millimetres 6 to 20, rarely as much as 30 and once 50. The last was close to the anterior superior iliac spine, so in both size and habitat resembled the tumour of *O. volvulus*. In the scalp the tumours may cup the skull. From them adults have been obtained entire by digesting the tissue with papaya juice or papaine in 0.2 per cent. hydrochloric acid. Microscopic examination of sections of eyes removed at autopsy and at operation suggests that the local lesions are at least partly due to the continued passage of large numbers of microfilariae through the lymph channels, and to the resulting oedema and perivascular infiltration. Eosinophilia in the blood lay between 25 and 50. Three species of *Eusimulium* are implicated, provisionally identified as *Eu. avidum*, *Eu. ochraceum* and *Eu. mooseri*. They take 3 to 5 minutes to fill themselves and in the process seem to have the power of attracting the microfilariae. For example, in one fly allowed to bite the face many more microfilariae are found than on direct examination of the skin; where section of the skin of the face has shown no microfilariae, a second section made through or near the spot where a fly has just bitten may show over 100. Although the larvae are most abundant on the head they may be found in every part of the body, even the toes, particularly if diagnosis is by the concentrative technique of examining an *Eusimulium* which has bitten there. In the fly general development is on the lines of *F. bancrofti*; the larvae are at first even more active than in the skin; as they broaden their movements become more stately, but when infective and measuring 0.45 to 1.14 mm. they move actively and even violently. Of 1,658 *Eusimulium* caught at random, about 5 per cent. were infected, and infective larvae have been surprised and preserved emerging from the labium. In diagnosis by skin reaction and precipitin some success is claimed, but details are not given. In prevention, removal of the tumours is advised, though it is noted that this does involve disappearance of microfilariae; but since the breeding places of *Eusimulium* are widely distributed in every running stream "the eradication of these flies in such coffee districts is entirely impracticable."

C. L.

STRONG (Richard P.). **Onchocerciasis in Guatemala.**—Reprinted from *Science*. 1931. May 29. Vol. 73. No. 1900. pp. 593-594.

In vitro plasmoquinin [? plasmochin] in dilution of 1 in 10,000 effectively destroys all microfilariae within 20 minutes, and nearly all in 30 seconds. Quinine in 1 in 5,000 solution produces somewhat similar results; neosalvarsan and mercurochrome were relatively ineffective; a serum obtained from a rabbit after repeated inoculations with extracts of microfilariae, adults, and whole tumours, was not filaricidal.

C. L.

FÜLLEBORN (F.). Ueber juckende Hauterscheinungen bei zwei deutschen Onchocerca-Trägern aus Südmexiko. Nebst einer Zusammenfassung über die auf Onchocerca-Infektion bezogenen Dermatosen und Versuche über den diagnostischen Wert der Cutanreaktion mit Onchocerca-Antigen. [**Pruritus in Two German Onchocerca Carriers from S. Mexico.**]—*Arch. f. Dermat. u. Syph.* 1931. Sept. 23. Vol. 164. No. 1. pp. 216–238. With 15 text figs. [1 page of refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

There are described two cases in Germans of *O. caecutiens* infection from Mexico. They both had an itching skin and one had xerodermia, conditions not hitherto associated with the Central American infection, though as regards the African some writers uphold its commonness while other deny its existence. The histological condition of excised skin in the one case, that with apparently normal skin, was practically normal, the skin too containing few microfilariae; the xerodermia skin not only showed considerably larger numbers of microfilariae but a marked perivascular infiltration, though neither was so obvious as in the skin of an Indian boy brought over to Europe from Guatemala. An antigen prepared by drying a nodule excised from one of these patients gave typical wheals, not only with them but also with onchocerca-free controls sensitive to ascaris and strongyloides antigens.

C. L.

HISSETTE. Sur l'existence d'affections oculaires importantes d'origine filarienne dans certains territoires du Congo. [**Eye Diseases of Filarial Origin in Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Mar. 31. Vol. 11. No. 1. pp. 45–46.

The territories are situated astride the Sankuru-Lubilash river in a region where 20 per cent. of onchocerca cases are blind and 50 per cent. of the population suffers from eye troubles. The disease differs from onchocerciasis as generally described by the large number of cysts, their size, and their very frequent but not exclusive localization on the head. There is, however, absence of erysipelas-like symptoms. Removal of the nodule has ameliorated ocular symptoms, and it is noted as curious that the natives are convinced that it is spread by Simulium. This is a preliminary report.

C. L.

RODHAIN (J.) & DUBOIS (A.). Observations de cas de parasitisme par *Onchocerca volvulus* chez l'Européen. Réactions cutanées. Allergie dans la filariose volvulus et la filariose loa. [**Cases of Parasitism by *O. volvulus* in Europeans. Skin Reactions—Allergy.**]—*Rev. Belge Sci. Méd.* Louvain. 1931. May. Vol. 3. No. 5. pp. 613–623. With 3 text figs. [10 refs.]

The authors report from the School of Tropical Medicine, Brussels, the cases of 8 Europeans who had lived in the Belgian Congo, 4 new. Diagnosis was always confirmed by puncture of a lymph gland or extirpation of a nodule. Xeroderma or ichthyosis has not been seen, but four cases showed chronic prurigo with papules, excoriation and some lichenization. Elephantiasis was not seen. Skin sensitiveness occurring in 50 per cent. of cases raised the question of sensitization;

and this has been tested against antigens obtained from *O. volvulus*, *L. loa*, ascaris, and bacteriological peptone and applied by scarification. The antigen was obtained by preserving the worm in *chloroform water*, drying and powdering, and scarifying a portion of the skin on which the powder had been spread. The reaction occurred almost equally well whatever the antigen, but was much more lively in those subject to prurigo; indeed in one person with *volvulus* but no prurigo there was no reaction.

In an addendum the authors state that they had not read of FAIRLEY'S results with *Dirofilaria immitis* antigen when their paper was written. They point out that their antigens were probably inferior to his, owing to preservation for a variable period in chloroform water before dissection, and also that the scratch test employed by them was probably a less satisfactory technique than intradermal injection. A supply of *Dirofilarial* antigen had recently been received from FAIRLEY, and they propose to test it on another series of cases in the near future.

C. L.

NORONHA (A. J.). **On the Presence of a Filarial Worm in a Tumour removed from the Left Side of the Nose of a Child.**—*Indian Med. Gaz.* 1931. Oct. Vol. 66. No. 10. pp. 556-560. With 3 text figs.

A baby girl of 6 months had had for 4 months frontonasal tumours, first diagnosed as dermoid cysts, showing inflammation and displacing the eyeballs outwards. Dissection of one was followed by the child's death. Sections of the tumour showed a coiled worm, the uterus filling the entire body cavity and containing sheathed embryos with anterior ends rounded and a taper occupying the posterior sixth. The guineaworm is excluded by its size, by the unsheathed embryos and by their tail-taper occupying a third of the body. The presence of a sheath, it is further pointed out, excludes *Onchocerca volvulus* among other filariae. ACTON, to whom sections were sent, excluded *F. medinensis* and *F. bancrofti*, and pointed out that the lesions resembled those of *O. caecutiens*, and that it was a unique case, probably an indication that India possessed an onchocerca. [Cattle in India suffer from onchocerca nodules.]

C. L.

DÉJOU (L.). Hydarthrose du genou avec présence de microfilaries dans le liquide articulaire. [**Hydarthrosis of the Knee with Microfilariae in the Fluid.**]*—Marseille-Méd.* 1931. Mar. 25. Vol. 68. No. 9. pp. 424-426.

Unsheathed microfilariae, whose size is nowhere stated, were found in nodules of the size of nuts under the skin of the thorax, and in fluid from a left knee joint which had been swollen for about a month. They are, apparently by exclusion and not by their anatomic characters, identified as those of *Onchocerca volvulus*; they occurred in a region (Togo) where *F. bancrofti* is completely unknown but where *F. persians* and *O. volvulus* are common. Reference is made to 5 cases of acute filarial synovitis reported by MAITLAND (*Indian Med. Gaz.* 1898, Oct.).

C. L.

MOHAMMED (Abdel Shafi). **Contribution to the Study of the Pathology and Morbid Histology of Human and Bovine Onchocerciasis.**—*Ann. Trop. Med. & Parasit.* 1931. Aug. 13. Vol. 25. No. 2. pp. 215–298. With 11 text figs. [69 refs.] [School of Trop. Med., Liverpool.]

The author summarizes the literature and reports on two tumours, one of *O. volvulus* and the other of *O. gibsoni*. The tumours varied in structure from being purely cellular, mainly endothelial, to being almost purely fibrous. It is suggested that this tissue reaction results in a spreading fibrosis which gradually drags in and imprisons the worm, juxta-articular nodules being possibly old and now uninhabited *volvulus* tumours. These tissue changes are correlated with those produced by *F. bancrofti*, and by schistosomes and those of infective granulomata; and must be due to a toxin, which also causes localized thickenings of skin, elephantiasis and enlarged glands. "The affection of the head in South America is explicable on the bionomics of the vector." It is argued from the histological appearances that the eosinophil cell neutralizes helminthic toxins.

C. L.

OCHOTERENA (I.). Contribución para el conocimiento de la onchocercosis en Mexico. Proceso histológico de formación de los fibromas onchocercosos. [**Onchocerciasis in Mexico. Process of Formation of Fibromata.**]—*In. Inst. Biol. Univ. Nac. Mexico.* 1931. Vol. 2. No. 2. pp. 109–115. With 7 text figs.

This is a description of the histological structure of an onchocerca tumour. The nematode itself is enclosed in a delicate endothelial membrane, probably the lining of a lymphatic vessel. Outside this and also in the interstices of the worm entanglement is a leucocytic infiltration of lymphocytes, polymorphonuclears, eosinophiles and many whose nature is unrecognizable owing to degeneration. In the centre is a viscid liquid and between the worm and the fibrous covering of the tumour is a cellular barrier of varying thickness. These cells are not of leucocytic origin, as some have thought, but are probably fibroblasts; a few elastic fibres are sometimes present. Around the vessels infiltration with cells of various types—swollen and proliferated endothelial cells, leucocytes, plasma cells and altered fibroblasts—is seen, the character depending on the age of the tumour.

H. H. S.

RAO (M. G. Ramachandra). **Guinea-Worm in a Boy aged 2.**—*Indian Med. Gaz.* 1931. Sept. Vol. 66. No. 9. pp. 504–505. With 2 text figs.

From a scrotal swelling, apart from the left testis and not extending to the inguinal canal, there escaped on incision pus and ten inches of a coiled up guinea worm.

C. L.

TOURNIER (E.). La chimiothérapie de la dracunculose. [**Chemotherapy of Dracontiasis.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. Jan.-Feb.-Mar. Vol. 29. No. 1. pp. 138-147. [22 refs.]

Tournier surveys the literature dealing with treatment of guinea worm infection by arsenic and antimony. He holds that although there have been disappointments, particularly in multiple infections, the effects of the drugs, especially of arsenic, should be studied in detail to determine how best to give them.

C. L.

ANDERSON (Hamilton H.). Anthelmintic Properties of Certain Alkyl Resorcinols.—*California & Western Med.* 1931. Aug. Vol. 35. No. 2. p. 138. [6 refs.]

BONELLI (Pablo). Analogía entre la Schistosomiasis Mansonii y la enfermedad de Banti o anemia esplénica.—*Bol. Asoc. Med. de Puerto Rico.* 1931. July. Vol. 23. No. 190. pp. 251-258. [5 refs.]

BRUG (S. L.). Filariasis in Nederlandsch-Indië.—*Nederl. Tijdschr. v. Geneesk.* 1931. 75th Year. No. 25. pp. 3371-3373.

CAWSTON (F. G.). The Control of Rushes and Water Lilies in Localities infested with the Bilharzia Parasitic Worms.—*Jl. Trop. Med. & Hyg.* 1931. Mar. 16. Vol. 34. No. 6. p. 84. [2 refs.]

VAN CREVELD (S.). Eine besondere Form von Ascaridiasis.—*Klin. Woch.* 1931. July 11. Vol. 10. No. 28. pp. 1306-1309. With 1 text fig. [17 refs.]

HOFFMAN (W. A.). Intestinal Parasitocides —*Porto Rico Jl. of Public Health & Trop. Med.* 1931 Sept. Vol. 7. No. 1. pp. 51-67. [29 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

KAISER (L.). Ontlasting-onderzoek en worm-eierendichtheid bij de Mandareesche kustbevolking. (Celebes en Onderhoorigheden).—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. July 1. Vol. 71. No. 7. pp. 714-717.

KELLER (A. E.), CASPARIS (Horton) & LEATHERS (W. S.). A Clinical Study of Ascariasis.—*Jl. Amer. Med. Assoc.* 1931. Aug. 1. Vol. 97. No. 5. pp. 302-306. [6 refs.]

KITAMURA (K.). Experimentelle Beiträge zur Kenntnis des Eindringens der Hakenwurmlarven in die Haut.—*Japanese Jl. Dermat. & Urol.* 1931. May. Vol. 31. No. 5. pp. 671-696 (79-104). With 7 text figs. [6 refs.] [In Japanese. German summary pp. 45-47. 1 ref.] [Dermato-Urol. Clinic, Med. Acad., Kumamoto.]

LEFÈVRE. Urticaire géante au cours d'une dracunculose.—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.-May-June. Vol. 29. No. 2. pp. 329-332. [1 ref.]

MATONO (A.). Ueber die *Strongyloides stercoralis* bei Enteritis polyposa.—*Fukuoka-Ikwadaigaku-Zasshi.* 1931. Sept. Vol. 24. No. 9. [In Japanese. German summary p. 94.] [Path.-Anat. Inst., Kyushu Imperial Univ., Fukuoka, Japan.]

MEXICO, INSTITUTO DE BIOLOGIA DE LA UNIVERSIDAD NACIONAL. Bibliografías : 1. Bibliografía relativa a la onchocercosis en Mexico y Guatemala (1919-1930) [CABALLERO y C. (Eduardo)].—5 pp. 1931. Chapultepec : Inst. de Biología.

MORGAN (D. O.). On the Occurrence of *Hepaticola hepatica* as a Natural Infection of the Wild Rabbit in England.—*Jl. Helminthology.* 1931. Feb. Vol. 9. No. 1. pp. 39-40. [7 refs.]

NAUDI (J.). Bilharzial Scrotal Calculi.—*West African Med. Jl.* Lagos. 1931. Vol. 5. No. 1. p. 12.

VANNI (Vittorio). Parassiti animali e appendicite.—*Riforma Med.* 1931. Sept. 21. Vol. 47. No. 38. pp. 1442, 1445-1447. With 2 text figs. [1 ref.] [Parasit. Inst., Univ., Rome.]

- YOSHIDA (Tomokazu). Experimentelle Untersuchungen ueber die Bedingungen für die Einwanderung von *Clonorchis sinensis* in den *Ductus pancreaticus*.—*Okayama Igakkai Zasshi* (*Zent. d. Okayama Med. Gesellsch.*). 1931. Apr. Vol. 43. No. 4. pp. 920-934. With 1 text fig. [In Japanese. German summary pp. 935-936.] [Path. Inst., Med. Univ., Okayama.]
- YOSHIMOTO (Seiichi). Ueber die quantitative Veränderung verschiedener Substanzen in der Leber bei Kaninchenclonorchiasis.—*Okayama-Igakkai-Zasshi* (*Zent. d. Okayama Med. Gesellsch.*). 1931. May. Vol. 43. No. 5 pp. 1103-1110. [27 refs.] [In Japanese. German summary p. 1111.] [Forensic Inst., Med. Univ., Okayama.]
- ZANALDA (Davide). Ascaridi lombricoidi eliminati per le vie urinarie maschili. Contributo clinico.—*Policlinico*. Sez. Prat. 1931. Aug. 3. Vol. 38. No. 31. pp. 1112-1113. [2 refs.]

REVIEWS AND NOTICES.

NEWMAN (Charles) [M.D. (Cantab.), M.R.C.P. (Lond.), etc.]. **Medical Emergencies.**—pp. ix+128. Churchill's Empire Series. 1931. London: J. & A. Churchill, 40, Gloucester Place, Portman Square. [8s. 6d.]

This must have proved a difficult book to write and on that account alone has a claim to an indulgent rather than a critical review. In the first place it can have been far from easy to decide what is meant by a medical emergency. The author in his preface defines the scope of his work as embracing those conditions in which accurate diagnosis and prompt correct treatment are necessary, but excluding operative or manipulative treatment. Nevertheless, he has found it impossible to exclude tracheotomy and blood transfusion which are certainly operative and others such as washing out the stomach in cases of poisoning and restoration of the apparently drowned which are undoubtedly manipulative. The mistake lies, as it so often does, in attempting to define. The author deals with the emergency stages only; subsequent treatment is not within the scope of the book. In other words it is a first-aid book for the medical man. There are separate chapters devoted to poisons, to conditions associated with coma and sudden paralysis, to convulsions, circulatory failure, haemorrhage, asphyxia, the colics, sudden insanity, and a few miscellaneous emergencies which would not fittingly come under the preceding. The book is largely of the nature of a handy reference, or reminder, for, with few exceptions, it contains little with which the modern qualified man is not well acquainted. It is good to see that Brudzinski's sign is considered of greater value than Kernig's in diagnosis of cerebrospinal fever, but it is not a fact that the onset of this disease is always slow, nor will all agree that cerebral haemorrhage is usually fatal. The chapter of advice regarding Sudden Insanity (Chapter VIII) is exceptionally valuable. For tropical practitioners the book will be found wanting; heat stroke and sunstroke together occupy but half a page, and no distinction is drawn between heat exhaustion and heat hyperpyrexia; malaria is not even mentioned as a cause of coma, and the anaemia of hookworm (which is mentioned) is not a "medical emergency." Misprints are too many for so small a book, but some errors cannot be put to the score of the printer. T.B. means tubercle bacillus not tuberculosis (p. 69), mucous is not a noun (pp. 73, 74) and "lie" is used almost always (6 times at least) as a transitive verb so that we are given the following instructions, difficult indeed to follow, for resuscitating the apparently drowned: "Hold the body upside down . . . Then undo clothing and lie face downwards, with the head turned to one side and start artificial respiration" (p. 83). A revised edition which will almost certainly be called for will doubtless prove more useful than the first.

H. H. S.

TUNISIE MÉDICALE. 1931. May. Vol. 25. No. 5. pp. 161-327.
With numerous illustrations.

Tunis is this year celebrating the 50th year since it came under French protection. The editors therefore of *La Tunisie Médicale*, which is the organ of the Société des Sciences Médicales de Tunis, publish a special number showing the progress achieved in all branches of medicine since 1881. The number contains 22 articles, most of them by doctors. They deal with conditions prior to the protectorate, progress in social hygiene, the hospitals, the Institut Pasteur and other topics too numerous to mention.

A. G. B.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES
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1932.

[No. 2.

BERIBERI.

ANNALES DE MÉDECINE ET DE PHARMACIE COLONIALES. 1930.
Oct.-Nov.-Dec. Vol. 28. No. 4. pp. 613-621. Une enquête
récente sur le bérubéri en Cochinchine (d'après le rapport annuel
de la Cochinchine). [**Beriberi in Cochinchina.**]

CAZANOVE. Une enquête récente sur le bérubéri en Cochinchine.—
Bull. Office Internat. d'Hyg. Publique. 1931. June. Vol. 23.
No. 6. pp. 1059-1064.

In 1927 the number of beriberi cases admitted to hospital in the countries of the Indochinese Union was 2,456. In 1928 the number was 3,669 distributed as follows: Tonkin 162, Cambodia 60, Annam 22 and Cochinchina 3,425.

A table is given showing the number of beriberi hospital admissions in Cochinchina since 1916. Thus in 1916 there were 988 admissions with 197 deaths; in 1927, 2,159 admissions with 595 deaths; and in 1928, 3,425 admissions with 600 deaths. This increase is found to be due to a recrudescence of the disease in the Western provinces of Cochinchina, the numbers in the Eastern provinces remaining fairly constant. The reason for this local increase is that the Western provinces are rich and the natives have substituted mechanically polished rice for the coarser variety. It is stated, however, that the diet, with the exception of rice, has a sufficient vitamin content.

On the clinical side, it was found that the dry form of beriberi is the more common; that it is in the rarer, wet form that sudden cardiac complications are encountered; and that the disease is rare in children and common in pregnant women, especially during the later months.

The treatment recommended by BERNARD has given satisfactory results. This consists in stimulating gastric activity; correcting the hydrochloric acid deficiency with "limonade chlorhydrique"; the exhibition of purgatives; omitting, or considerably reducing, starchy foods in the diet, and replacing them with meat, fresh fish, green vegetables and fruit. Strychnine proved of some value in treating nervous symptoms. Lastly, the Governor of Cochinchina issued instructions recommending the use of incompletely decorticated rice

according to a special formula. Rice thus prepared, either taken solely or mixed with the polished variety, gave satisfactory results but it is still too early to base arguments upon them.

The remainder of the paper deals with reports from local medical men concerning the extension, etiology, symptoms and treatment of beriberi in the various provinces of the country.

A. D. Bigland.

BAILBY (Jean). Etude clinique de quelques cas de béri-béri. [**Clinical Study of Cases of Beriberi.**—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. May. Vol. 9. No. 5. pp. 281-292.]

A small outbreak of beriberi occurring among "disciplinaires" at Dap-cau is described. The first case was noticed at the beginning of March, and by April 10th there was a total of 21 cases among 102 men. About the same time, a small outbreak of diarrhoea was also reported.

Immediate steps were taken to deal with the beriberi epidemic and most satisfactory results were obtained in a surprisingly short time. The chief measures employed were: (1) *lessening the hours of work*. On February 1st (i.e., before the outbreak), the daily amount of work had been increased from 8 to 10 hours. Later it was reduced to 9 hours. (2) *Modification of the diet*. The daily ration of rice was reduced from 820 grams a day to 500 grams and the difference made good with vegetables and fruit. After April 10th (when 16 new cases were discovered) polished rice was entirely replaced by imperfectly decorticated rice and the amount increased to 700 grams. The ration was also increased in respect of fresh meat, fat, fish, fresh vegetables and fruit. The salt ration was slightly diminished.

The author stresses the fact that it was the alteration in the quality of the rice and not the quantity nor the increase in meat, vegetables and fruit which brought about the rapid relief of symptoms and apparently put an end to the outbreak.

The origin of the epidemic seems to have been associated, on the one hand, with physical fatigue, and on the other, with a B-avitaminosis. No evidence of any infection was noted. In addition to dietary alterations, treatment consisted in complete rest, purging with sodium sulphate and the administration of digitaline in small doses to those patients in whom oedema was marked.

A clinical description of the disease, with details of some of the cases, is given.

A. D. B.

JANTZEN (Walther). **Beriberi-like Polyneuritis.**—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 96-101. [Truxillo Railroad Company Hosp., Puerto Castilla, Honduras.]

There have been previous reports of cases showing a beriberi-like polyneuritis in the Truxillo Railroad Company Hospital, Puerto Castilla, Honduras. In the years 1925-1927 there were 5 cases, in 1928 18 cases, and in the years 1929 and 1930 there were 11 cases in each. Similar cases have been observed in Trinidad de Santa Barbara, Honduras. Almost all the patients were adult males and not more than one case occurred in any one family.

The clinical features of the recent outbreak are similar to those observed in former years, i.e. the type in which motor dysfunction predominates, and those milder cases in which sensory symptoms are chiefly noted. Oedema, except for a slight swelling of the legs, is absent.

Meat, corn, beans, cheese and rice are the main foods used by the patients, and the author believes that food deficiency will not explain the clinical findings and that it is impossible to say that the diet is very poor in vitamin B. Moreover, it is pointed out that this diet is common to all the middle and lower class Hondureans and that, if it were at fault, the disease should be very much more widely spread than it is. The influence of inorganic poisons, alcoholism, syphilis and malaria can be excluded. Improved social conditions do not lessen the liability to the disease.

The prognosis is good, but the disease may be of long duration. Some cases under observation for a time have remained well, but relapses do occur. During a period of 5½ years, only two fatal cases were encountered. Both of these died from cardiac failure. Two cases are described in detail, one presenting typical appearances and the other being the second of the two fatalities.

The author is of the opinion that the question whether the condition is beriberi or a polyneuritis of unknown origin, remains unanswered. The absence, or great rarity, of oedema and the presence of vitamin B in the diet constitute the two chief difficulties in diagnosing beriberi.

A. D. B.

DE ARAUJO (Eduardo). Beriberi e bacillus beriberi Matsumura et al. 1929. [**Beriberi and Matsumura's Bacillus.**]—*Brasil-Médico*. 1931. July 25. Vol. 45. No. 30. pp. 686–691. English summary.

The following account is taken from the English summary. After reviewing the theories of the origin of beriberi, the author shows that that of Vitamin B deficiency does not fit the beriberi of Bahia, Brazil, where the disease occurs in the state jail and insane asylum. The diets here are not poor in Vitamin B. Some observations lead to a supposition of contagion; for instance the occurrence of beriberi amongst members of the guard, who are on a different diet, when the disease is prevalent in the jail. Agglutination tests were done with the *Escherichia* described by MATSUMURA, with the conclusion that this organism cannot be considered the specific cause of beriberi in Bahia.

A. G. B.

PAVY (A. B.). **Beri-Beri : its Medical and Economic Interest and Specific Treatment.**—*New Orleans Med. & Surg. J.* 1931. Feb. Vol. 83. No. 8. pp. 559–564. [1 ref.]

The chief etiological factor in beriberi is the bacillus discovered by Japanese physicians [MATSUMURA *et al.* this *Bulletin*, 1929, Vol. 26, p. 965]. Vitamins have no specific curative value though avitaminosis should be regarded as a predisposing factor in the disease. The drug urotropin (hexamethylenetetramine) is a specific for beriberi.

Details of treatment are as follows : Decayed, cheap rice, old wheat flour or old macaroni must be immediately removed from the food supply in order to prevent re-infection. A diet containing milk, eggs, meat and bread is recommended. For milder cases a saline purgative every second morning, preceded by calomel grains 6 at the onset, together with urotropin grains

7½ every four hours (four doses a day) should be given. Under this treatment pains in the legs and gastric discomfort will disappear in 48 hours, dyspnoea and palpitation in 3-4 days and cure can be expected in 15-21 days.

For acute and more advanced cases the only differences in the treatment are rest in bed and more drastic purgation. Thus, in the more obstinate cases in this class, in addition to the urotropin, calomel grains 4-6 with podophylin grain ½ should be given every fifth night in 2 grain doses at hourly intervals and followed by a saline. These patients are usually relieved in eight days and cured in six weeks.

It is important to note that only the best grades of urotropin should be used and that when given with plenty of water such complications as strangury and haematuria will be avoided. After 10-15 days continuous use of the drug it is advisable to stop the administration for three or four days.

The author claims that the above treatment has "never failed," though it has no preventive value. Seven cases are quoted in some detail.

A. D. B.

JANSEN (Bard Coenraad Petrus), KINNERSLEY (Henry Wulff), PETERS (Rudolph Albert) & READER (Vera). **The Curative Activity of the Antineuritic Vitamin of Rice.**—*Biochem. J.* 1930. Vol. 24. No. 6. pp. 1824-1826. [6 refs.] [Lab. for Physiol. Chem., Amsterdam & Biochem. Dept., Oxford.]

The vitamin from rice polishings has been isolated by Jansen and DONATH (1926) in a crystalline form. The present paper deals with the estimation of the activity of these crystals by curative tests on pigeons and rats and by their growth-promoting effects on *Streptothrix corallinus*.

It was found that these three methods of testing did not yield absolutely consistent results, but curative tests with rice vitamin crystals "gave the following activity per day dose of vitamin; pigeon 0.007 mg. by injection, 0.009 mg. by mouth; rat 0.005 mg. Tests upon the micro-organism *S. corallinus* gave 0.006 mg. per diem."

A. D. B.

AALSMEER (W. C.) & RICHTER (C. S.). Over den invloed van adrenaline op den diastolischen bloeddruk bij de beri beri en de beteekenis daarvan voor de kliniek. [**The Influence of Adrenalin on the Diastolic Blood Pressure in Beriberi and its Significance for Diagnosis.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. July 4. 75th Year. No. 27. pp. 3539-3546. [5 refs.] [Dutch Indies Med. School, Soerabaja.]

An adrenalin reaction, as it may be called, was to be expected from the fact that not only the ganglion cells of the sympathetic nervous system but also the suprarenals are affected in beriberi. This reaction is manifested especially in the definite effect on the minimal blood pressure. If this pressure is already zero, naturally the effect is not evident, but it is usually found that some rise in the diastolic pressure occurs simply after admission to hospital and that then the test can be applied. An example of this test is as follows:—A patient was admitted with positive crural vascular murmur and blood pressures becoming successively day by day, 95/25, 100/25, 100/35, 100/40, 100/45, 100/50, 100/50, 105/60, 105/60, 105/60, 110/60, 115/60 and 115/65, with ultimate loss of the vascular murmur. On the 2nd day,

with blood pressure at 100/25, an injection of 1 mgm. adrenalin was given subcutaneously and pressures read every 5 minutes with these results:—90/0, 90/0, 90/0, 90/0, 95/0 and 95/0. A second injection was given on the 11th day, by which time the blood pressure had the value 105/60; the effect of the adrenalin was similar but not so striking. The authors conclude that the test is of use as an indicator of the stage of the disease and of the therapeutic effect. It is especially the minimal or diastolic pressure which is significantly affected and in this respect beriberi may be grouped along with aortic insufficiency and exophthalmic goitre in its reaction to adrenalin.

W. F. Harvey.

SARGENT (Willard S.). **Early Beriberi.**—*Ann. Intern. Med.* 1931. Apr. Vol. 4. No. 10. pp. 1340–1343. With 1 fig.

Two cases of early beriberi occurring in Japanese fishermen, aged 23 and 19 respectively, are described.

A. D. B.

ADVIER. Quelques éléments du diagnostic différentiel du béribéri.—*Marseille-Méd.* 1931. Jan. 25. Vol. 68. No. 3. pp. 104–109.

DE ARAUJO (Eduardo Lins Ferreira). Em torno da etiologia do beriberi. (Investigação preliminar.). These de livre escolha para concurso de professor cathedratico da Cadeira de Medicina Tropical.—pp. xvi+163. [16 pages of refs.] 1930. Bahia: Oficinas da Livraria "Duas Americas", Praça da Inglaterra.

BELFANTI (Serafino). La dislocazione delle lecitine del riso e suo rapporto col beriberi.—*Sperimentale*. 1931. Oct. 3. Vol. 85. No. 4. pp. 195–213. [47 refs.]

SARKAR (Sarasi Lal). Epidemic Dropsy in a Family at Sandwip Island.—*Indian Med. Gaz.* 1931. Mar. Vol. 66. No. 3. pp. 121–124.

PELLAGRA.

LOWE (John). **Pellagra in the Deccan. A Report on 40 Cases occurring among Lepers at the Leprosy Hospital, Dichpali, Hyderabad, Deccan.**—*Indian Med. Gaz.* 1931. Sept. Vol. 66. No. 9. pp. 491–500. With 14 text figs. [23 refs.] [Leprosy Hosp., Dichpali.]

About six years ago, pellagra was first observed in the Leprosy Hospital, Dichpali, Hyderabad. The cases were then only few in number and but one or two deaths were recorded. Since then, the disease has increased until in this year (1931) about 20 cases have come under observation. Some 40 in all have been reported, with about 10 deaths.

The disease appears in December, increases till March, and has cleared up by May. Of the 20 patients in 1931, 11 were females and 9 males (only about one quarter of the total inmates of the hospital are females). The age incidence varies between 14 and 40. Only about 6 of the patients contracted pellagra before admission.

The clinical manifestations were typical. The dermatitis appeared on the hands, forearms, feet, legs, face, neck, extensor aspects of the thighs and upper arms, the upper parts of the chest and back, and upon the genitalia. Intestinal symptoms were not marked. Lesions of the mouth were observed in about half. Nervous and mental symptoms did not constitute a usual feature. Some of the severe cases showed myocarditis with dilatation of the heart, tachycardia, dyspnoea and oedema of the feet. Cardiac failure was the usual cause of death. Of those patients who remained under observation six had recurrent attacks.

As regards diet, the following facts should be noted :

“ The institution is a mission institution with limited funds and the dieting is done by each patient for himself : each patient is given half a *seer* (1 lb.) of unmilled rice each day, one *chapati* made from *jawari* flour with salt and a little *ghee*, one anna with which to buy sundries from the institution shop and firewood with which to cook his food. In addition, when available from the institution gardens, vegetables are issued, but only in small amounts and for limited periods. The one anna a day is spent in buying *dhal*, meat, fish or vegetables when available.”

The diet is admittedly poor, but is probably better than that obtaining in the patients' homes. The caloric value is between 2,300 and 2,700 calories a day. This is insufficient even though the people are of small build and do no heavy work. The protein and fat are markedly deficient, and the carbohydrate excessive. Not only is the protein low in amount, but it is also poor in value. In addition, mineral salts and vitamin A are lacking. Finally, it should be noted, that the women's ration is less than the men's, and that some of the patients prefer to save their money rather than spend it upon extra food.

Treatment consisted in giving milk, meat, fruit and vegetables together with arsenic and tonics. Recently, yeast has been employed. The author has found [as other workers have done] that the mild cases recover without any treatment, and the severe cases die in spite of treatment.

There is considerable doubt as to the cause of the pellagra outbreak here described. The diet is, admittedly, poor in protein, but if this

were responsible the disease should be widely spread throughout Southern India, whereas, as a matter of fact, pellagra is rare. On the other hand, the incidence of the disease was much greater following the regular issue 12 months previously of a ration of 4 ozs. of bread made from jawari flour (a kind of millet). Against the possibility of this ration having any etiological significance is the fact that about 30 of the patients being Mahrattas eat no rice and take jawari as their staple diet, and yet no case of pellagra has occurred among them.

The observation that the disease is practically unknown in the surrounding district, and has broken out in this institution where the diet is poor, but no worse than outside, suggests the possibility of some local endemic infection being present, or that the leprosy, from which all the patients suffered, in some way rendered them more liable to pellagra.

Detailed case reports are given, and the literature is fully reviewed.

A. D. Bigland.

KUMER (L.). Ueber versprengte Pellagra in Tirol. [**Sporadic Pellagra in Tyrol.**].—*Wien. Klin. Woch.* 1931. June 26. Vol. 44. No. 26. pp. 849-852. [29 refs.] [Clinic for Dermat. & Syph., Univ., Innsbruck.]

Up to the War, Innsbruck was the only Austrian endemic centre for pellagra, cases being admitted from all the surrounding districts to the clinic for dermatology and syphilis. Since the War, South Tyrol, which was the chief endemic area, has come under Italian rule and the cases, therefore, go elsewhere. North Tyrol, however, having different racial and nutritional characteristics, still belongs to Austria and occasional cases of pellagra are still admitted to the Innsbruck clinic.

In 1925 MERK published the first case of endemic pellagra coming from the surroundings of Innsbruck. In 1926 ARZT met with two further cases, and in 1929 yet another two cases, here described, were recorded.

The author discusses various sporadic outbreaks of pellagra in Germany and in German-speaking areas, and reviews them in the light of the chief etiological theories of the disease.

Finally, he shows that the two cases described are true pellagra and not merely sun erythema occurring in alcoholic subjects.

A. D. B.

EUSTERMAN (George B.) & O'LEARY (Paul A.). **Pellagra Secondary to Benign and Carcinomatous Lesions and Dysfunction of the Gastro-intestinal Tract. Report of Thirteen Cases.**—*Arch. Intern. Med.* 1931. Apr. Vol. 47. No. 4. pp. 633-649. [28 refs.] [Mayo Clinic, Rochester, Minn.]

The authors summarize the results of their observations as follows :

" Pellagra developed in eight patients with obstructing benign lesions or dysfunction (late, after operation) of the upper part of the digestive tract, in two with obstructing carcinomatous lesions, in one with gastric syphilis and in two with lesions of the colon (one carcinomatous, one inflammatory). This secondary form of pellagra tends to support the theory that diatetic deficiency is the cause of the disease. In the cases reported, the clinical

manifestations of the disease were not as marked as those of the active endemic type of pellagra. Treatment may be ineffectual in cases with mechanical obstruction, or in those with marked impairment of motility of the upper part of the digestive tract, until the mechanical condition is corrected. Surgical intervention is attended by high mortality. Case reports covering the essential clinical features are submitted."

A. D. B.

GUHA (B. C.). **Vitamin B₂ and Pellagra. The Etiology of Pellagra.**—*Brit. Med. J.* 1931. July 11. pp. 53-54. [15 refs.] [Biochem. Lab., Cambridge.]

The author passes in review the work of GOLDBERGER and traces the growth of our ideas about pellagra etiology from the original protein deficiency theory to the now widely accepted belief that the disease is due to a lack of vitamin B₂ or P-P factor.

It is pointed out, however, that it is not yet clear whether human or experimental pellagra is really due to an uncomplicated deficiency of B₂ vitamin or whether the experimental dermatitis in rats is a true analogue of the human disease. As regards the latter, the following observations should be noted: the condition in rats cannot be reproduced uniformly by vitamin B₂ deficiency; very often arrest of growth in vitamin B₂ deficiency is not associated with skin symptoms; experiments of the author show that severe, but not complete, deprivation of vitamin B₂ leads to a generalized depilation in rats, not usually associated with lesions of the mouth and paws and rapidly cured by the administration of Eli Lilly's Liver Extract No. 343; small quantities of marmite sufficient to prevent beriberi favour the development of pellagra-like symptoms in rats; rice, millet and maize are all poor in vitamin B₂ but human pellagra appears to be especially associated with maize consumption.

Recent work [see the paper by BLISS below] suggesting that human pellagra, the experimental disease in rats and black tongue in dogs may be due to iron deficiency, is discussed. The author states that depilation in rats following upon a deficiency in vitamin B₂ was not due in his experiments to this cause, since the iron intake was sufficient to cover the requirements of the animal and the condition was not cured by the administration of haemin (25 mgm. per day) or haemoglobin (0.5 gm. per day). The observation that sugar in the diet causes pellagra symptoms in rats to appear more regularly is interesting in this connexion, since it has been shown that the fasting anaemic dog is more easily able to regenerate red cells and haemoglobin than the animal fed with sugar. The lowering of the red cell count in vitamin B₂ deficiency found by other workers was confirmed.

The author is of the opinion that: "Pellagra is a complex syndrome arising from an association of various factors, in which the deficiency of an antipellagra factor (Goldberger's P-P factor), which is possibly, but not necessarily, identical with the growth-promoting vitamin B₂, is the main but not the sole factor. Thus, iron might be one of the limiting factors, especially so far as depilation is concerned . . . vitamin B₂ may play a part in a particular phase of iron metabolism."

Finally, it is urged that the terms vitamin B₂ and anti-dermatitis (anti-pellagra?) factor should not be used interchangeably as is the common practice.

A. D. B.

BLISS (Sidney). **Considerations leading to the View that Pellagra is an Iron-Deficiency Disease.**—*Science*. 1930. Dec. 5. Vol. 72. No. 1875. pp. 577-578. [2 refs.] [Med. School, Tulane Univ., New Orleans.]

It is claimed that the following considerations support the view that pellagra is an iron-deficiency disease.

Pellagra is practically unknown in very young children. Puppies, kittens, rabbits and babies have, at birth, an iron concentration about three times greater than that found in adults. The disease is more prevalent among women, especially during the age period 19-44 years. This may be associated with the menstrual loss of iron (which, it is calculated, may amount to 3 mgm. a day) and with the low iron content of the diet in the Southern States of America. The active agent in P-P factor (or vitamin G) may be iron, in view of its great thermostability and its absorption by kaolin.

Examination of the diet responsible for the causation, prevention and cure of black-tongue in dogs reveals that syrup of the iodide of iron was added to the curative and preventive diets, but not to the others. It is to be noted that the iron was added or withheld merely for the sake of the general mineral constitution of the diet. Those foods (beef, liver, egg yolk, yeast) which contain much P-P factor are rich in iron, while conversely pellagra-producing diets (molasses and corn bread) are poor in this constituent.

The anaemia associated with pellagra may be due to iron deficiency and the achlorhydria causing lessened absorption of iron due to increased alkalinity of the duodenum, may be of importance. KOLLATH found that the administration of alkaline haematin prevented symptoms appearing in rats fed upon a diet deprived of P-P factor. This protection may be due to iron.

In 51 cases of human pellagra iron was administered (orally in mild cases; intravenously in severe cases) with very encouraging results. In experimentally produced black-tongue in dogs the exhibition of iron by the intravenous route, without any alteration in diet, restored the animals to a normal appearance.

A. D. B.

SABRY (Ibrahim). **On the Chemical Nature of the "Pellagra Toxin" and the Discovery of the Thiosulphate Treatment of Pellagra.**—*Jl. Trop. Med. & Hyg.* 1931. Sept. 15. Vol. 34. No. 18. pp. 303-309. [Govt. Hosp., Alexandria, Egypt.] Also in *Jl. Egyptian Med. Assoc.* 1931. Dec. Vol. 14. No. 12. pp. 603-610.

— **On the Chemical Nature of Pellagra Toxin and the Thiosulphate Treatment of Pellagra.**—*Lancet*. 1931. Nov. 7. pp. 1020-1022. [2 refs.]

— **Note on Pellagra.**—*Jl. Trop. Med. & Hyg.* 1931. Dec. 1. Vol. 34. No. 23. p. 391.

The paper opens with a long technical account of the chemistry of pigmentation. The opinion is put forward that "the toxin of pellagra" must be causally related to the hyperpigmentation present in the disease. The toxin, it is suggested, is dioxypyhenylalanine. This substance may exist in any cereal, but apparently beans are

the chief source. The author strongly disagrees with the vitamin deficiency theory of pellagra.

On chemical grounds, it was hoped that sodium thiosulphate would be beneficial in the treatment of pellagra, and that the exhibition of this drug would lead to the neutralization or disintegration of the toxic substance. In practice, it was found that this drug had a rapid curative effect upon the chief symptoms of the disease, viz., the skin lesions, diarrhoea, marasmus, insomnia and melancholia. The method of administration is to give a daily intravenous injection of 10 cc. of a 10 per cent. sodium thiosulphate solution. The solution is, of course, duly sterilized and the number of injections varies between 20 and 60. There are no contra-indications, and no complications have followed the treatment.

In a footnote the editor of the journal states that 24 cases of pellagra were so treated, the average number of injections being 36. Presumably, the patients were in hospital, but no mention is made of their diet.*

A. D. B.

TURNER (Roy H.). et al. **The Pathologic-Physiology of Pellagra.**

I. Tabulated Clinical and Physiologic Data [TURNER (Roy H.)].—*Jl. Clin. Investigation.* 1931. Apr. 20. Vol. 10. No. 1. pp. 61-70. [5 refs.] **II. The Serum Albumin and Globulin** [TURNER (Roy H.) with BLANCHARD (Virginia)]. pp. 71-85. With 3 figs. [15 refs.]. **III. The Serum Calcium and Phosphorus, with Especial Reference to Nervous Symptoms** [Do. Do.]. pp. 87-98. With 1 fig. [13 refs.]. **IV. Serum Electrolytes and Acid-Base Equilibrium** [Do. Do.]. pp. 99-110. With 3 figs. [18 refs.]. **V. The Circulating Blood Volume** [TURNER (Roy H.)]. pp. 111-120. With 1 fig. [6 refs.] [Med. School, Tulane Univ. of Louisiana, & Charity Hosp., New Orleans.]

Pellagra is still not a disease of which it can be said that the etiology, diagnosis, pathology, prognosis and treatment are certainly known. Thus, for example, in spite of treatment along the most approved lines, more than 25 per cent. of the pellagrins admitted to the New Orleans Charity hospital die in that institution.

The present research was undertaken to accumulate more exact knowledge of the "pathologic physiology" of the disease. Observations were made upon 42 cases in the Charity Hospital, New Orleans. All had typical skin lesions and other manifestations of the disease. The group consisted of 6 white men, 9 white women, 9 negro men, 16 negro women and 2 negro children. 13 (31 per cent.) died in hospital. Only 3 had had previous attacks. Glossitis was present in 62 per cent.; diarrhoea in 60 per cent.; gastric analyses were carried out upon 34, of whom 29 were found to have achylia.

The first study was usually made one or two days after admission, and observations were repeated at 5 to 15 day intervals, so long as the patient remained in hospital. All were given a special diet.

"This diet has a daily caloric value of 2,500 to 3,500 calories, contains more than 100 grams of protein a part of which is liver or sweetbread, and

* In No. 23 (Dec. 1) of the *Journal of Tropical Medicine and Hygiene*, the author gives under the heading "Details of diet given to pellagra patients" the constituents of four diets, afterwards referred to as "this same diet" and notes that it has little or no effect on the cause of pellagra.—Ed.

contains an abundance of green leafy vegetables and 500 cc. buttermilk. It is given to patients with diarrhoea in bland form, and, when necessary, a liquid caloric diet of similar caloric value was given by gavage. Routinely there was included for the vitamin content 30 cc. of fresh brewers' yeast three times a day, 150 cc. of orange or lemon juice daily and, in addition, some of the patients received 4 cc. of cod liver oil three times a day."

The results of the biochemical examinations may be given shortly as follows :

(1) *Serum Albumin and Globulin Concentration.* 129 specimens of blood were examined from 42 cases. Apparently the average figure for serum albumin in the normal individual is 4.80 gm. per 100 cc. and the range is 5.65-4.20. All the pellagrins had, at some time, a serum albumin value below 4.20 per cent. and 95 per cent. of the cases had, at least, one value below 3. There was little tendency for the concentration of this constituent to increase during the disease and frequently it fell, even when the diet was adequate, as regards protein and vitamins. It is suggested that this low value is due to damaged digestion following upon injury to the alimentary tract, and is the result of pellagra, since in very early cases, the serum albumin content is nearly normal. In uncomplicated cases the serum globulin concentration was found to be slightly increased.

(2) *Serum Calcium and Phosphorus.* Under this heading, calcium concentration is chiefly considered. Estimations of calcium and phosphorus were made and the figure of the former was compared with the expected serum concentration, calculated according to Peters and Eiserson's formula (this formula is $\text{Ca} = 0.255 \text{ P} + 0.556 \text{ protein} + 7$, when calcium and phosphorus are expressed in mgm. per 100 cc. and protein as grams per 100 cc.). It was found that among pellagrins there was a tendency for the serum calcium values to be considerably higher than the calculated values, while among other patients, without obvious bone disease, these two figures approximated. Abnormalities in serum calcium concentration among pellagrins appear to be related to disturbances of the nervous system. Whether these are causal or incidental has not yet been determined.

(3) *Serum Electrolytes and Acid-base Equilibrium.* The concentration of serum electrolytes tends to be low in pellagra and this is probably associated with diarrhoea and sometimes vomiting. There seems also to be a direct relationship between the lowering of the serum electrolyte figure and the severity of the disease.

In 125 determinations of the CO_2 -combining power of the plasma, 84 per cent. gave results within the normal range. Marked increase of serum inorganic phosphorus is rare, and when present seems to be associated with oliguria resulting from diarrhoea and vomiting. In 32 per cent. of 53 determinations of "total fixed base" the figure was less than 141.

(4) *Circulating Blood Volume.* As regards plasma volume in pellagra, 32 per cent. showed a figure above normal and 68 per cent. below normal. 5 per cent. of the pellagrins showed a red cell volume above normal, and 95 per cent. below. Of the total blood volumes, 17 per cent. were above ideal values and 82 per cent. below.

A possible relationship between the magnitude of the blood volume in pellagra and the clinical features of severe skin lesions is discussed.

A. D. B.

ANDING (Curt) & SINANI (Anna). Das Blutbild und physikalisch-chemische Veränderungen des Blutes bei Pellagra. [**Physico-chemical Changes in the Blood in Pellagra.**]-*Arch. f. Schiffsu. Trop.-Hyg.* 1931. Mar. Vol. 35. No. 3. pp. 171-175. [8 refs.] [*Therap. Hosp. Clinic, Med. Faculty, Odessa.*]

Twelve pellagrins in Odessa Hospital with definite skin, tongue and alimentary symptoms were examined. The results may be given

shortly as follows : The specific gravity of the blood and the haemoglobin content were lessened in all cases. The red blood cells and reticulocytes were much reduced in number. The colour index varied around unity ; in only two cases was it greater than one. The above findings, together with the absence of pathological types of red blood cells, show that the anaemia in pellagra is of the simple secondary variety and not of the pernicious type, which the work of MOLLOFF seemed to suggest. There was also marked leucopenia and a relative lymphocytosis. Some of the more important physico-chemical findings were :

(1) Van den Bergh's test gave an indirect reaction in all cases. The figure for bilirubin was, as a rule, higher than 1.6. (2) There was no great change in corpuscular fragility. (3) The serum and plasma albumin, estimated by the refractometric method, was slightly less than normal. (4) Blood coagulation time was slightly accelerated (18 to 27 mins. as opposed to the normal 25 to 30 mins.). (5) Blood clot retractility was slightly greater than normal (7-12 mm. as opposed to the normal 6-8 mm.). (6) The expansile power (Dehnbarkeit) of the clot was normal. (7) There was no marked alteration in the blood platelet count, figures between 75,000-220,000 being obtained.

A. D. B.

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- BOSCH (W. G.). Een waarschijnlijk geval van Pellagra bij een Javaan.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Apr. 1. Vol. 71. No. 4. pp. 382-388. With 9 figs. on 3 plates. [9 refs.] [Catharina Hosp., Dutch American Plantation Co., Kisaran.]
- GUILLAIN (Georges), MOLLARET (P.) & LEREBoullet (J.). Un cas français de pellagre avec paraplégie.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1931. Apr. 27. Year 47. 3rd Ser. No. 13. pp. 597-604. With 2 text figs.
- ILES (U. G.). Psychosis with Pellagra.—*Med. Bull. Veterans' Administration formerly U.S. Veterans' Bureau Med. Bull.* 1931. Oct. Vol. 7. No. 10. pp. 937-939. [2 refs.]
- KRJUKOFF (A.). Blut und Blutbildung bei schweren Fallen von Pellagra.—*Folia Haematologica*. 1931. Sept. Vol. 45. No. 2. pp. 196-206.
- MARTIN (J. T.). Pellagra.—*Southern Med. Jl.* 1931. Apr. Vol. 24. No. 4. pp. 297-299. [9 refs.]
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UNDULANT FEVER.

LE CHUITON & NEGRIE. Deux cas de mélitococcie traités par les dérivés acridiniques et réflexions sur ce mode de traitement. [**Two Cases of Undulant Fever treated with Acridine Derivatives.**]—*Arch. Méd. et Pharm. Nav.* 1931. Jan.-Feb.-Mar. Vol. 121. No. 1. pp. 5-14. With 2 charts. [7 refs.]

The authors refer to previous reports of cases of undulant fever treated by acridine derivatives, acriflavine (British), trypaflavine (German) and gonacrine (French).

Two cases are described, the first that of a sailor infected in Oran by drinking goat's milk; a very severe case with high fever, enlargement of liver and spleen, and pleural effusion from which *Br. melitensis* was isolated in pure culture, as well as from the blood. The patient was admitted to hospital in the first week in March. By the middle of the month his condition was very grave and the prognosis gloomy. He was then given an intravenous dose of trypaflavine, 5 cc. of a 2 per cent. solution, and 4 days later 10 cc., and 5 days later 15 cc. Following on this last injection a marked improvement was at once manifest and the patient made a complete although slow recovery.

Case 2 was a laboratory infection; in his case gonacrine was employed and was given in the first week of the fever, 8 cc. of a 2 per cent. solution, followed by 15 cc. two days later and a third dose 6 days later. The fever abated and the whole illness did not last more than 3 weeks.

Discussing the employment of these drugs the authors detail their method of administration by the intravenous route and point out that a peculiar form of erythema may follow a dose of these acridine salts, due to the action of strong light on the skin. Cases of toxic action on the kidneys and liver have also been reported but are rare. The authors consider that the drugs have a direct action on the bacteria and recommend a trial of the method in similar cases.

D. Harvey.

SANFILIPPO (Emanuele). Sulle complicate nervose che possono insorgere nel corso della febbre Mediterranea. [**Possible Nervous Complications of Undulant Fever.**]—*Giorn. di Clin. Med.* 1931. May 20. Vol. 12. No. 7. pp. 507-510, 513-514. [18 refs.] [Inst. of Demonstrative Med. Path., Univ., Catania.]

Nervous complications in undulant fever have been reported for many years, such as meningismus with headache, photophobia, even convulsions, also chorea, psychoses, ascending paralysis and peripheral neuritis. Various authors' interpretations of the term "nervous complications" have been so elastic that some (ROUSSEAU, LANGUET, WURTZ) have stated that they occur in 75 per cent. of patients, whereas others (CANTANI, for example) regard them as very rare. The symptoms were usually looked upon as due to toxin. The case recorded is of considerable interest.

A man of 20 years was taken ill at the beginning of May, 1930, with fever and prolonged rigor. After a week the temperature fell, but remained at or about 38° C.; the patient's general state was good and he was able to return to work. Early in July, he had pain in the spine, headache, fever, constipation and occasional vomiting. Physical examination revealed muscular rigidity, marked Kernig's sign, Babinski extensor, exaggerated deep reflexes. Blood and spinal fluid cultures both gave a

growth of *Br. melitensis*; serum agglutinated at 1 : 1,000; W. R. negative with serum and spinal fluid. Treatment by vaccines and urotropin intravenously had no effect, and on September 30th an intrathecal injection of antimelitensis serum (10 cc.) was given and within 24 hours there was relief of headache and spinal pain. After 5 such injections on alternate days, there was marked progress, and the patient left hospital October 26th after 11 days apyrexia. He still showed some paraesthesia of the legs and fleeting pains.

H. H. S.

ANDREW BALFOUR MEMORIAL.

To the Editor of the Tropical Diseases Bulletin.

SIR,

It has been decided to found a memorial to Sir Andrew Balfour, K.C.M.G., C.B., I.L.D., M.D., F.R.C.P., who it will be remembered died in January last, shortly after the opening of the London School of Hygiene and Tropical Medicine, of which he was the first Director.

When funds are available it is intended to place a simple and inexpensive monument in the School, and with the remainder of the sum received to establish an Andrew Balfour Memorial Fund for helping students, preferably from overseas, to pursue courses of study at the School. We feel that Balfour's many friends all over the world would not wish to miss the opportunity of contributing to such a memorial, and we should therefore be grateful if you would kindly allow this letter to appear in your columns. We are confident that even considerations of hard times, heavy taxation or other depressing circumstances will not deter those friends from helping to build up a fund of worthy proportions as a permanent memorial to a magnificent career.

While it is hoped that all who can do so will send a donation in the near future, it is not proposed to limit the period during which the fund will remain open, and promises of donations or bequests will be gratefully acknowledged.

Contributions should be sent to the Honorary Treasurer, Andrew Balfour Memorial Fund, London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.

Yours faithfully,

JAMES CRICHTON-BROWNE
JAMES CURRIE
M. H. G. FELL
W. H. N. GOSCHEN
D. LYALL GRANT
W. W. JAMESON
P. S. JELLEAN

LYOYD
MONTAGU NORMAN
W. ORMSBY-GORE
A. T. STANTON
HENRY S. WELLCOME
C. M. WENYON
REGINALD WINGATE

London School of Hygiene and Tropical Medicine.
January, 1932.

KALA AZAR.

ADLER (S.) & THEODOR (O.). **Investigations on Mediterranean Kala Azar. I-V.**—*Proc. Roy. Soc. Ser. B.* 1931. Aug. 1. Vol. 108. No. B 759. pp. 447–502.

The investigations described in these papers were carried out at Catania with the support of the Anonymous Bequest Fund of the Royal Society with the object of studying kala azar in the Mediterranean area, particularly with a view to the elucidation of its method of transmission. The first deals with epidemiology, the second with experimental work with the causative organism, *Leishmania infantum*, the third with the distribution and bionomics of sandflies, the fourth with their infection and the fifth with the distribution of sandflies of the *Major* group in relation to the disease.

i. **Introduction and Epidemiology.** pp. 447–453.

Though kala azar is distributed irregularly throughout the Mediterranean basin the three largest foci are at Catania where 150–200 cases occur annually, Naples with 70 cases and Palermo with 70 cases, and their surrounding villages. In the largest foci the human and canine disease always coexist but the ratio of human to canine cases varies considerably in the different areas. The variations are due in the authors' opinion to differences in the bionomics of the insect vectors. Epidemiological studies by JEMMA in Palermo and Naples and by LONGO in Catania have revealed several important features of distribution. In Sicily the disease is prevalent in the coastal regions and is limited by altitude. Of 1424 cases collected by PARADISO none occurred above 733 metres and the majority below 214 metres. Enna and Cesaro at 1,100 metres, though within the endemic area, have no cases. A similar distribution has been noted by PITTALUGA in Spain. In Catania LONGO and his colleagues have shown that the cases occur almost entirely in the periphery of the town. This characteristic has been observed in Naples, Palermo and Spanish foci. As is well known the occurrence of the disease chiefly in young children differentiates it from Indian kala azar. In Sicily about 60 per cent. of the cases occur in infants up to the age of two. The disease is prevalent throughout the year but in Catania is commonest in March and April. The disease in India differs from that of the Mediterranean area in the frequency of family infections, the frequency of house to house infections, the shorter incubation period, its rarity in infants under one year of age and the heavier incidence during epidemic periods. That the Mediterranean disease is not transmitted by the oral route is indicated by its rarity in thickly populated urban slums and its frequency in breast-fed infants. It is concluded that an insect vector must have a bacteriologically sterile intestinal tract since bacterial contamination is fatal to leishmania and must be readily infected since parasites are scanty in the peripheral blood. Evidence is produced to indicate that *Phlebotomus perniciosus* and *P. papatasi* might both be vectors, but the former more so than the latter.

ii. *Leishmania infantum.* pp. 453–463. With 5 figs. on 1 plate & 1 text fig.

Examination of the peripheral blood by the culture method of 36 cases for the presence of parasites gave a positive result in 33. In

22 cultures were obtained when 0.03 cc. of blood was inoculated to the tubes. The development of the parasites in cultures is described and certain features in which it differs from Indian strains are noted. Serologically the Catania strains did not differ from a human and canine strain from Tunis and *L. donovani* of India. Geckos, which had been suspected as a possible reservoir of the parasite, were examined to the number of 51 (49 *Tarentola mauritanica* and 2 *Hemidactylus turcicus*). No leishmania were observed in or cultured from these and inoculation failed to infect a number. The absence of *Leishmania tarentolae* which occurs in geckos in other localities is noteworthy. From 17 of the 49 specimens of *T. mauritanica*, *Trypanosoma ptyodactyli* was cultivated. As *Phlebotomus minutus* occurs in Algeria and Tunis where *Leishmania tarentolae* is found and not in Sicily, it is possible that this sandfly is the vector of the parasite of the gecko. Infections were produced in mice, in the Syrian hamster (*Cricetus auratus*) and in *Microtus g  ntheri*. A detailed description of the pathology of the disease in these animals is given. Particular attention is drawn to the marked enlargement of the adrenals and the concentration of infected cells round the inter-lobular veins of the liver and their absence from the intra-lobular veins.

iii. **The Sandflies of the Mediterranean Basin. Distribution and Bionomics of Sandflies in Catania and District.** pp. 464-480. With 4 text figs.

This section deals with the characters and habits of the sandflies of the Mediterranean basin. Twenty species or varieties, some of them new, are described and a useful diagnostic table given. There is much valuable information regarding the bionomics of these sandflies, all of which has a direct bearing on the question of kala azar transmission. The commonest species in the Catania district are *Phlebotomus papatasi* and *P. perniciosus*. They are constantly present but their relative frequency varies during the sandfly season. Like the rarer species they are present in greatest numbers at the periphery of the town in the vicinity of stables and gardens. *P. perniciosus* was found to be most frequent during the first 10 days of October. Thus on October 8th over 300 unfed females were observed in the living room of a house in a suburb of Catania. In this house 70 to 80 per cent. of the sandflies caught were *P. perniciosus*.

iv. **Infection of Sandflies with *Leishmania infantum*. Natural Parasites of Wild Sandflies in Catania. Observations on *Trypanosoma ptyodactyli* Catouillard.** pp. 481-493. With 3 text figs.

Three methods of feeding sandflies on leishmania were used. The flies were allowed to ingest cultures or infected bone marrow through sterile membranes, they were fed on cases of the disease in man or were fed on infected hamsters. The general result was that the parasites develop more readily in *P. perniciosus* and *P. major* than in *P. papatasi* and *P. sergenti*. A small percentage of *P. perniciosus* fed on human cases of kala azar became infected though the number of parasites taken up from the peripheral blood must have been very small. Furthermore the rate of development of *L. infantum* in *P. perniciosus* appears to be more rapid than that described for *L. donovani* in *P. argentipes* in India and *P. chinensis* in China. The infection rate of *P. perniciosus* and *P. papatasi* after

feeding on experimental hamsters with parasites in the corium of the skin was 83.3 and 0.75 per cent. respectively. In one experiment in which 13 *P. major* fed on one hamster 12 became infected. The high infection rate in *P. perniciosus* and *P. major* is considered to show that there exists a specific relationship between these sandflies and *L. infantum*. Fifteen infected *P. perniciosus* were made to feed by Hertig's method which involves the insertion of the proboscis into a fine capillary tube. After feeding the fluid remaining in the tube was examined for flagellates. In 5 cases these were present in small numbers (1-20) but in one several hundred were found. It is evident that the flagellate forms of *L. donovani* are able to leave the proboscis during the feeding act.

As regards the type of flagellate found in infected flies special attention is called to certain short forms with long flagellum which are typical of late stages of infections in sandflies and from their position and behaviour the authors think that they are the forms most likely to enter a vertebrate host.

A Chinese hamster inoculated intraperitoneally with the organisms from infected sandflies became heavily infected. Five mice inoculated subcutaneously and 7 mice intraperitoneally did not become infected. A human being who had previously had and recovered from oriental sore as a result of inoculation with *L. tropica* from infected *P. papatasi* was inoculated in two places in the skin of the leg with *L. infantum* from sandflies. After two weeks two papules appeared at the sites of inoculation but though the papules were still present after more than 4 months repeated examination failed to reveal leishmania. A dog was inoculated in both ears in London with flagellates from two sandflies which had been imported. On arrival the sandflies were dead but the flagellates were still active. Examined 7 months later the bone marrow of the dog revealed no leishmania.

Examination of wild sandflies (3,839 *P. papatasi*, 100 *P. sergenti*, 222 *P. major* and 751 *P. perniciosus*) revealed flagellates of the *L. infantum* type in one *P. perniciosus* taken from a room in which a case of kala azar was sleeping. One female *P. parroti* var. *italicus* showed an infection of crithidia, probably developmental forms of *Trypanosoma phryodactyli*, which was found in the blood of 17 out of 49 specimens of *Tarentola mauritanica* examined. A few females of *P. papatasi* showed fungi in the alimentary tract, *P. perniciosus* fungi and yeasts in the coelom while nematodes were found in the coelom of five sandflies and ectoparasitic mites on others.

Both *P. papatasi* and *P. parroti* fed on geckos harbouring *Trypanosoma phryodactyli* became infected with flagellates resembling the crithidia found in the wild fly. The infection was limited to the stomach and cardia, flagellates being attached to the rhabdiorium. It is thought probable that the trypanosome is transmitted by the bite of a sandfly, *P. parroti* rather than *P. papatasi*, for in nature the former does but the latter does not feed on geckos.

v. Distribution of Sandflies of the Major Group in Relation to Mediterranean Kala Azar. Summary and Conclusions. References.
pp. 494-502. [45 refs.]

As a result of the observations described in Sections I-IV the authors concluded that *Phlebotomus perniciosus* is to be considered the

important carrier of kala azar in Sicily. The fact that the ingestion of a small number of parasites produces persisting infection in these sandflies, that the flagellates tend to assume an anterior position and escape during feeding, that the distribution of this sandfly coincides with that of kala azar and that it readily feeds on man are all in favour of this supposition. The local race of *P. major* is also a possible carrier but its distribution is not nearly as wide as that of the disease.

C. M. Wenyon.

NAPIER (L. Everard), assisted by C. R. Das GUPTA. **An Epidemiological Investigation of Kala-Azar in a Rural Area in Bengal.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 295–341. With 12 figs. & 1 map in text. [5 refs.]

The authors describe an epidemiological study of kala azar which they made during the years 1925–1930 in an area $3\frac{1}{2}$ miles long and 2 miles broad with a treatment centre at the village of Kaorapukkur which is itself about 5 miles from Calcutta. Though near the city the conditions were typically rural. There was a population of 5,143 in 1927 and this has undergone no abnormal change since. Of the 5,143, 3,186 were Hindus, 323 Mohammedans and 1,634 Christians. These live in 25 villages with populations varying from 26 to 642. The majority are agricultural labourers in the adjoining rice fields. The economic condition is low but malnutrition when it occurs is usually due to unsuitability of diet rather than to lack of food. Kala azar is endemic in the area and during the observations was in a condition of sub-epidemic exacerbation. Evidence is produced to show that during the six years' study a large percentage of the cases of the disease came under notice. There were diagnosed in all 389 cases. During the second year there was an apparent rise in the incidence but subsequently there was a steady fall, which, when compared with the state of affairs in adjacent areas, seemed to be due to the treatment of infected persons. In about one third of the cases there was a possibility that simultaneous infection of two or more persons had occurred in one house but in a big percentage there was an intervening period of about a year between the cases when more than one occurred in the same house. The incidence in children up to the end of the 12th year was more than double that in adults. This would indicate that children are more susceptible than adults. Again the incidence in villages varied from 0 to 23.65 per cent. of the total population of the area and among Christians it was almost double that among Hindus.

It was shown that infection persisted in the skin of a number of treated persons and the suggestion is made that this cutaneous persistence of parasites may constitute a source of infection during hypo-endemic periods. It may also account for the fact that in households single cases crop up year after year. If this view is correct the incidence of skin infections should be a measure of the kala azar endemicity in any particular area. Households with many occupants were more commonly attacked than those with few. On the other hand in the smaller household there was a greater chance of all its members becoming attacked. In endemic areas in Bengal when a wave of exacerbation of kala azar occurs it is more wide spread but less catastrophic than is the disease in Assam. Few villages escape but none

is wiped out. The facts seem to indicate an individual resistance of the majority of the population. As regards the mode of transmission it is not claimed that the observations throw light on the exact method but it is maintained that they can be fitted into the hypothesis that *Phlebotomus argentipes* is the vector of the disease.

C. M. W.

KERMACK (W. O.) & MCKENDRICK (A. G.). **Mathematical Analysis of Dr. Napier's Statistics of House Infection in Kala-Azar.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 343-350. [Royal College of Physicians, Edinburgh.]

A mathematical analysis of the figures relating to household infections obtained by NAPIER in connexion with the observations recorded in the paper reviewed above indicate an intra house infection which is not inconsistent with the assumption of sandfly transmission.

C. M. W.

SHORTT (H. E.), SMITH (R. O. A.), SWAMINATH (C. S.) & KRISHNAN (K. V.). **Transmission of Indian Kala-Azar by the Bite of *Phlebotomus argentipes*.**—*Indian Jl. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1373-1375.

The paper gives an account of an experiment in which 7 hamsters were subjected to the bites of *Phlebotomus argentipes* infected with *Leishmania donovani*. The total number of feeds by sandflies varied from 22 to 149. By dissection of some of the sandflies, as in previous experiments, it was found that at least 2 to 49 infected flies had fed on the animals. The actual number was larger than this for the condition as regards infection of 20 to 101 flies was not known. The duration of the experiment for the 7 hamsters varied from 9 to 17 months. Four of the animals were found dead and no proper examination was possible. In one that was found dead microscopic examination revealed no parasites. The two surviving hamsters on which had fed 144 and 143 sandflies, a large proportion of which, from the results of the examination of samples, must have been infected, were killed on the 511th day from the commencement of infection. In neither was the spleen enlarged but in one the presence of leishmania was demonstrated by microscopic examination and by culture. This is the first occasion on which *Leishmania donovani* has been experimentally transmitted by the bite of a sandfly. [See this *Bulletin*, Vol 28, p. 639.]

The authors think that the infection rate by the bite of *P. argentipes* may be a low one, for transmission did not occur in the case of 35 other hamsters similarly experimented upon. It is possible that this low rate is dependent upon the fall in virulence of the parasite which appears to run parallel with the passing of the epidemic of kala azar from Assam.

C. M. W.

SHORTT (H. E.), SMITH (R. O. A.) & SWAMINATH (C. S.). **Transmission of Kala-Azar through *Phlebotomus argentipes* by the Oral Route.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 351-352.

The paper records experiments in which infection occurred in one of two Chinese hamsters made to eat *Phlebotomus argentipes* infected

by feeding on emulsions of liver and spleen of kala azar animals; while none of three became infected after eating sandflies infected by feeding on cultures.

C. M. W.

KHAW (O. K.). **Transmission of Kala-Azar to Hamsters (*Cricetulus griseus*) by feeding them with Infected Carcasses.**—*Nat. Med. Jl. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 599-616. [30 refs.] [Peiping Union Med. College, Peking.]

Of 10 healthy hamsters which were allowed to feed on the carcasses of experimentally infected hamsters three contracted the infection.

C. M. W.

HINDLE (Edward). **The Development of Various Strains of *Leishmania* in Chinese Sandflies. (A Report of the Kala Azar Commission of the Royal Society.)**—*Proc. Roy. Soc.* Ser. B. 1931. July 1. Vol. 108. No. B 758. pp. 366-383. [7 refs.]

It has already been shown that the Chinese strain of *Leishmania donovani* develops into the flagellate stage in the stomach of both *Phlebotomus chinensis* (= *P. major* var. *chinensis*) and *P. sergenti* var. *mongolensis* but it is only in the former that the flagellates attach themselves to the lining of the anterior part of the crop and invade the pharynx and buccal cavity. The present paper deals with the development of an Indian strain of *L. donovani*, a Tunis strain of *L. infantum* and a Baghdad strain of *L. tropica* in these flies. These parasites were inoculated from cultures into hamsters but it was only in the case of the first two that generalized infections resulted. In the case of *L. tropica* infection occurred only in the testis and as would be expected sandflies fed on the infected animals showed no trace of development of flagellates. That both the sandflies mentioned would probably be suitable for the development of *Leishmania tropica* into flagellates was indicated by the behaviour in the stomach of cultural forms fed artificially to the flies. In the case of the other two strains generalized infections were produced in hamsters and sandflies of both species fed on them became infected. The flagellates, however, were limited to the stomach and showed no tendency to attach themselves. Furthermore the percentage of sandflies which became infected after feeding was very much lower than was the case when the Chinese strain of *L. donovani* had been employed. The results, which are given in detail in a series of tables, suggest that though there is a general capacity for leishmania to develop into flagellates in the stomach of sandflies it is only when some biological relationship exists between the fly and the particular leishmania used that the flagellates attach themselves and extend into the proboscis. Such a relationship appears to exist between *P. major* var. *chinensis* and Chinese strains of *L. donovani*.

C. M. W.

NATTAN-LARRIER (L.). Les leishmanioses autochtones en France et la lutte contre leur extension. [**Leishmaniasis in France and Measures to control it.**]—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 447-482. [10 refs.]

The author draws attention to the wide spread nature of kala azar in human beings and dogs in the South of France. In addition to the

cases which have been recorded in the literature and are reviewed in the paper there are many others of which he has knowledge which have not been published. He is of opinion that the disease is extending in France and that the position is more serious than many suppose. On this account he urges a careful enquiry into the whole question. Marcel LEGER in commenting on the paper states that the author is justified in his remarks though it is far from clear in what relation the canine disease stands to that in human beings. In Dakar, for example, where human kala azar is unknown, LAFONT and HECKENROTH in 1914 recorded 5 cases in dogs and he himself in 1922 saw several cases in these animals.

C. M. W.

PAWLOWSKY (E.). Zur Entdeckungsgeschichte der Leishmania-parasiten. [**History of Discovery of Leishmania.**]—*Zent. f. Bakt.* I. Abt. Orig. 1931. Nov. 20. Vol. 123. No. 1/2. pp. 14-19. With 1 text fig. [4 refs.] [*Milit. Med. Acad., Leningrad.*]

The author presses the claims of BOROWSKY as the discoverer of the parasite of oriental sore. Dr. P. F. BOROWSKY, a young military surgeon, was stationed in Tashkent in 1892 and there, armed with a Zeiss microscope, conducted observations on Sart sores. His results were published in Russian in 1898 in the military medical journal and the author gives a translation of the Russian text and a reproduction of an illustration. It is clear from this that BOROWSKY actually observed the leishmania and noted that they were usually intracellular. They occurred in greater number in the young than in the old sores. The organism is described as spherical or spindle-shaped and having within it a nucleus which not infrequently showed a process passing to the opposite side of the body. On the process a small spherical thickening could be seen. The conclusion is that the parasites on account of the position of the nucleus at the side and the occurrence of flagellum-like outgrowths which were observed in fresh preparations belong to the class Protozoa. It is evident that BOROWSKY was observing the parasite of oriental sore, that in 1898 he gave a recognizable description and illustration of it and that he correctly concluded that it was a protozoon. Though the parasite had previously been seen by CUNNINGHAM in 1885 and by FIRTH in 1891, their descriptions were far from clear.

C. M. W.

GUPTA (C. R. Das). **The Serum-Formalin Proportion in the Aldehyde Test for Kala-Azar.**—*Indian Med. Gaz.* 1931. Sept. Vol. 66. No. 9. pp. 500-502. [6 refs.] [*School of Trop. Med., Calcutta.*]

As a result of varying the proportion of serum to formalin in the aldehyde test for kala azar a number of fallacious results have been obtained. In order to determine which proportion gave the best results a series of tests with the sera of 56 cases of kala azar was made. It was found that adherence to the rule laid down by the originator of the test should be strictly observed. This consisted in adding one drop of 30 per cent. formalin to 1 cc. of clear serum in a small test tube and mixing by gentle shaking. In order to ensure that clear serum is obtained the procedure of washing out the syringe with normal saline before withdrawing blood may be adopted. The result depends on complete opacity, partial opacity or no change at the end of 24

hours and should be interpreted as positive, doubtful or negative. In strongly positive cases the end result may be read in about half an hour.

C. M. W.

CHOPRA (R. N.), CHAUDHURY (S. G.) & DE (N. N.). **Changes in the Physical Properties of Kala-Azar Serum with Treatment and its Relation to the Formolgel Reaction.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 423-430. With 22 graphs. [5 refs.] [School of Trop. Med., Calcutta.]

The authors have tested the viscosity of the serum of kala azar cases undergoing treatment with pentavalent antimony compounds. At the same time the rate of occurrence of gelation and complete opacity of serum under the influence of formalin was noted. The results show that the viscosity of sera does not decrease for about two months after treatment has been commenced.

The time of complete opacity begins to increase after about 10 to 15 days whereas the time of gelation increases after about 20 to 30 days. It is suggested that the protein responsible for gel formation is not euglobulin.

C. M. W.

BLACKLOCK (D. B.) & LOURIE (E. M.). **The Demonstration of Viable Leishmania in the Faeces of Experimentally Infected Bed-Bugs.**—*Ann. Trop. Med. & Parasit.* 1931. Aug. 13. Vol. 25. No. 2. pp. 359-368. With 1 text fig. [12 refs.] [School of Trop. Med., Liverpool.]

The experiments described were undertaken to discover if living leishmania occurred in the faeces of bed bugs previously fed on cultures. The bugs were fed through mouse skin covering one end of a U-tube filled with culture while viability of leishmania in the faeces was tested by direct microscopical examination or inoculation of culture media. The faeces were collected by allowing the bugs to feed on a cleaned area of the arm of a human subject. In the great majority of cases the faeces of the bug deposited on the skin proved to be bacteriologically sterile. The organisms tested were *Leishmania tropica*, *L. donovani*, *L. donovani* var. *infantum*, *L. braziliensis* and *Herpetomonas culicidarum*. Viable forms of all these were found in the faeces, the longest interval between ingestion of culture and examination of faeces with a positive result being 35 days in the case of *L. tropica*.

C. M. W.

BLANC (Georges) & CAMINOPÉTROS (J.). Quelques expériences sur la transmission du kala-azar par la tique du chien *Rhipicephalus sanguineus*. [**Experiments on the Transmission of K.A. by the Dog Tick.**]—*C.R. Soc. Biol.* 1931. Sept. 18. Vol. 107. No. 26. pp. 1493-1495. [2 refs.] [Pasteur Inst., Athens.]

The authors record further experiments with dog ticks fed on hamsters (*Citellus citillus*) suffering from experimental kala azar. Larvae of the dog tick were placed on an infected hamster and were removed on the fifth to the eighth day. Ten days later after ecdysis had occurred a batch of the nymphs, as they then were, was emulsified and injected intraperitoneally into ten hamsters. Three months later

five of the animals were killed and one was found heavily infected. Two months later one of the remaining animals died with a heavy infection. Five to six weeks later another died but no infection was found. Another animal died twelve days later, seven months after inoculation, with an intense infection. The two surviving animals were killed two to three months later and were found to be uninfected. A second batch of the nymphs were allowed to fix themselves to five hamsters which were sacrificed after about three months. No infection was found. A third batch of nymphs were allowed to fix on an infected hamster. They were collected from the seventh to the ninth day. Nineteen days later they had moulted and become adults. Twenty were emulsified and inoculated intraperitoneally to five hamsters. Two months later one was sacrificed and found free from infection. About two and a half months later one died but had no infection. Four months later, seven months after inoculation, one of the survivors died with a heavy infection. The two survivors sacrificed later showed no infection.

In another experiment 30 gorged nymphs were removed from a dog suffering from naturally acquired kala azar. An emulsion of the nymphs was made and with it five hamsters were inoculated intraperitoneally. Two died in 13 days without detectable infection. Twelve days later another died without infection. A fourth died just over four months from the time of inoculation and the fifth about five weeks later. Both these animals had a massive infection.

The authors note that from these results it is evident that hamsters inoculated as described may develop an infection slowly so that examination after two or three months may not reveal an infection which is developing. Furthermore parasites will survive in ticks for at least 21 days even though ecdysis occurs during the interval.

C. M. W.

SAHA (B.). Treatment of Kala-azar by 25 per cent. Aqueous Solution of Sodium Antimony Tartarate and Resumé of Other Non-Intravenous Methods.—*Calcutta Med. Jl.* 1931. Mar. Vol. 25. No. 9. pp 335-338.

The author having noted in the British Journal of Children's Diseases (1930) the report of a case of infantile kala azar from Egypt successfully treated with rectal injections of tartar emetic, has tried the treatment in 5 cases and found it satisfactory. The method used is very simple. The rectum is washed out with tepid normal saline. Then 2 cc. of a 0.25 per cent. solution of sodium antimony tartrate is injected. Injections are given every second day, the dose being increased on each occasion by 2 cc. till 8 cc. is reached. Injections are then given every fourth day, the dose being again increased by 1 cc. till 12 cc. is reached. In children up to 2 to 3 years of age 12 cc. was the maximum dose but in a girl 10 years of age this was increased to 24 cc. In 4 cases the average duration of treatment was 2 months and the average number of injections 18. The treatment caused no rectal irritation and antimony was demonstrated in the urine by Reinsch's method two days after administration of a dose. In one case, a boy of 2, amoebic dysentery developed during the antimony treatment. This was interrupted and emetine administered. After recovery from the dysentery tartar emetic treatment was resumed and a cure resulted.

The author has also tried intramuscular injections of tartar emetic and hyperacid antimony tartrate in cases in which, for one reason or another, it was not possible to give intravenous injections. The former is very painful and often leads to abscess formation. On the other hand the latter, though painful, has not caused suppuration. The symptoms may be relieved by the use of hot compresses for half an hour after injection and at 8-hourly intervals for the next two days.

C. M. W.

BRAHMACHARI (Phanindranath) & BRAHMACHARI (Upendranath).

The Intensive Antimonial Treatment of Kala-Azar.—*Jl. Trop. Med. & Hyg.* 1931. Aug. 15. Vol. 34. No. 16. pp. 263-264. [2 refs.] [Brahmachari Research Inst., Calcutta.]

The authors point out that one of them (U.N.B.) in 1925 described a series of cases of kala azar which had been successfully treated with urea stibamine administered daily or on alternate days or several times a day during a period of thirty-six hours to seven days. Since then records of a series of 125 cases in which intensive treatment with urea stibamine was successfully carried out have been kept. It is noted that with this drug intensive treatment gives as good results as those obtained with any other antimonial but it has to be remembered that certain cases even early ones are resistant; to this reference will be made in a later paper. In the intensive treatment of adults extending over six to nine days the daily dose of urea stibamine given intravenously varied from 0.025 to 0.2 gram.

C. M. W.

KUNDU (Saratsashi). **A Note on the Control of Kala-Azar in Assam by Urea Stibamine.**—*Indian Jl. Med.* 1931. Aug. Vol. 12. Pt. 4. pp. 168-171.

The author, who has been in touch with kala azar work in Assam since 1917, states that up to 1920 segregation of infected persons, evacuation of sites and houses and burning of huts and clothes were the only possible methods adoptable to prevent the spread of the disease. Owing to the hardships inflicted by these methods there was an ever-increasing tendency on the part of the population to conceal cases. In 1920 the efficacy of tartar emetic treatment was widely circulated and during this and the following five years increasing numbers came for injections. The figures for the six years were 7,118, 15,880, 19,659, 35,071, 48,770 and 60,940. Though the percentage of deaths during this period was reduced from 39.3 to 10.4 matters were not entirely satisfactory owing to the long course of treatment necessary and the reluctance of many patients to complete the course. Then urea stibamine was introduced by BRAHMACHARI and gave a greater certainty of cure in a much shorter time. In 1925 it took the place of tartar emetic and it is assumed that the increase in numbers for that year was due to the popularity of the new treatment. In the following three years, 1926-1928, the numbers declined as follows:—49,355, 33,475 and 23,579. Similarly the death rate fell from 10.4 in 1925 to 8.9, 8.6 and 7.0. If the author's conclusions are correct, the good result obtained was due to the introduction of urea stibamine, but he does not consider the possibility of any natural rise and fall in the incidence of the disease.

C. M. W.

SHANKS (G.) & DE (M. N.). **Studies in the Histology of the Spleen, Bone, Marrow and Liver in Cases with Splenomegaly, with Special Reference to those due to Kala-Azar.** (1) **The Connective Tissue and Reticulum.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 457–468. With 5 figs. (1 coloured) on 3 plates. [10 refs.]

The paper deals exclusively with the liver and spleen from a series of 31 cases of splenomegaly, 26 of which were due to kala azar. In 80 per cent. of the proved cases of kala azar the spleen showed no increase of fibrous tissue or reticulum. This was true also of 70 per cent. of the livers. It is concluded that fibrosis of the spleen and cirrhosis of the liver cannot be considered regular features of kala azar itself.

C. M. W.

Row (R.). **Agglutination in Leishmaniasis.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 641–655. With 3 figs. on 1 plate. [33 refs.] [Grant Med. College, Bombay.]

The author has shown that with an appropriate antigen the phenomenon of agglutination can be observed with the sera from cases of kala azar. The antigen giving this result is prepared as follows. A four-day culture of leishmania on the surface of solidified haemoglobin [see this *Bulletin*, Vol. 28, p. 155] is gathered in a loop and shaken up with 2 cc. of a 0.85 per cent. solution of sodium chloride. When the suspension is quite homogeneous and uniform it is submitted to a temperature of 55.5° C. for one hour and then left at 22° C. for 24 hours or more to let the heavier flagellates settle. The supernatant fluid is then found to be of uniform opalescence. This is the standard antigen which keeps for over a month. The test is carried out by mixing in capillary pipettes equal quantities of antigen and serum diluted 1 in 30. At the end of two hours examination with a lens will reveal granule formation. The granules become visible to the naked eye in three hours and by four hours have produced a deposit. The reaction is a group one for it occurs with antigen made from the parasite of oriental sore. Sera from cases of this disease, however, do not give good agglutination.

C. M. W.

MESSIK (K. E.). Zur Frage ueber normale Trombozytobarine in bezug auf Leishmanien. [**Thrombocyto-barins in Normal Blood in Reference to Leishmania.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. June. Vol. 35. No. 6. pp. 334–336. [6 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

It has been stated by CHODUKIN and SOFIEFF working in Middle Asia and also by BUROWA from the same district that the serum of normal laboratory animals not infrequently contained thrombocyto-barin which gave a positive adhesion reaction with leishmania. This led BUROWA to assert that when applied to laboratory animals as a test of infection with leishmania the reaction was of no value. The author accordingly decided to test the sera of animals in Moscow where serological changes which might result from the bites of infected

sandflies could not occur. The test was carried out with 30 mice, 8 dogs and 8 rabbits with the result that all were negative except 4 of the mice. Two canine strains gave a strongly positive reaction, while a strain of *Leishmania tropica* was weakly positive. The author does not accept BUROWA's assertion that the degree of the reaction is sufficient to indicate that *Leishmania donovani* and *L. tropica* are genetically distinct nor does he hold that the occasional occurrence of thrombocyto-barin in normal animals renders the test useless.

C. M. W.

NAPIER (L. Everard) & HENDERSON (J. M.). **The Erythrocyte Sedimentation Rate in Kala-Azar.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 691-699. With 4 charts in text. [School of Trop. Med., Calcutta.]

The conclusion reached is that the sedimentation rate though probably greater in kala azar than in any other disease is unlikely to prove of any practical value in diagnosis or as an indication of the progress of treatment.

C. M. W.

KUROTCHKIN (T. J.). **An Attempt to immunise Hamsters against Kala Azar.**—*Nat. Med. Jl. China.* 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 458-463. [6 refs.] [Peiping Union Med. College, Peking.]

It was found that apart from certain individuals which are naturally resistant to infection susceptibility of hamsters to kala azar is absolute in that infection may occur even when very few parasites are injected. Vaccines prepared from flagellate and non-flagellate forms of leishmania did not protect animals against infection but tended to render them even more susceptible to inoculation.

C. M. W.

WIGMORE (J. B. A.) & CAMERON (W. M.). **Two Cases of Infantile Kala-Azar.**—*Jl. Roy. Army Med. Corps.* 1931. June. Vol. 56. No. 6. pp. 449-453. With 1 text fig. [6 refs.]

The paper gives the history of two children aged 5 and 2½ years belonging to one family which came to Egypt from Malta in December 1928. The younger child, a boy, was admitted to hospital in May 1930 suffering from general malaise and debility with occasional evening pyrexia. There was found to be enlarged liver and spleen associated with a mildly febrile condition and a blood picture of mild anaemia with definite lymphocytosis and large mononuclear increase but no abnormal cells or leucocytosis. The boy's sister was found to have a similar condition. Spleen puncture performed on the boy revealed numerous leishmania. Both children were treated with foudadin, but as there was no improvement they were invalided to the United Kingdom. It was concluded on account of the extreme rarity of kala azar in Egypt that the disease had been contracted in Malta and had remained latent during the 18 months in Egypt.

C. M. W.

PLAZY, GERMAIN & MARCANDIER. Un cas de kala-azar méditerranéen chez l'adulte observé à Toulon. [**Case of K.A. in an Adult at Toulon.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. July 20. Year 47. 3rd Ser. No. 25. pp. 1332-1337. [14 refs.]

The case recorded is that of a man 36 years of age who contracted kala azar at Toulon where he had lived continuously for the past five years. Though the disease in children is known in Toulon a case in an adult has not hitherto been noted. The discovery of leishmania was not made till after death though kala azar was suspected towards the end when cancrum oris developed. The nature of the disease was obscured by the presence in the blood of *Plasmodium vivax* and by ascites. Death was directly due to a severe intestinal haemorrhage. A re-examination of blood films made during life revealed a few leishmania.

C. M. W.

OLMER (Jean). Kala-azar de l'adulte. [**K.A. in an Adult.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. Oct. 19. Year 47. 3rd Ser. No. 26. pp. 1506-1510. [Refs. in footnotes.]

Record of a case of kala azar in a young man who contracted the disease in Marseilles. A puncture of the much enlarged spleen having failed to reveal leishmania splenectomy was performed. Death resulted from haemorrhage and at post-mortem numerous leishmania were found in the spleen and liver. Though kala azar in children is quite common in Marseilles this appears to be the first case in an adult.

C. M. W.

LEREBoullet (P.), CHABRUn (J.) & BAIZE (P.). Un cas de kala-azar infantile observé à Paris. [**Case of Infantile K.A. seen in Paris.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. June 8. Year 47. 3rd Ser. No. 19. pp. 932-936. With 3 text figs. [1 ref.]

The case described is that of a child five years of age which contracted the disease on the Mediterranean coast of France. A complete cure was obtained by intramuscular injections of stibional which contains 0.018 gm. of antimony per cubic centimeter. The child received 27 injections representing a total of 86 centigrams of antimony. The formol gel reaction was carried out and the authors emphasize its importance in giving an indication of progress during treatment.

C. M. W.

BENHAMOU (Ed.), GILLE (R.) & NOUCHY (A.). Kala azar de l'adulte suivi de guérison. [**K.A. in an Adult. Recovery.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. May 25. Year 47. 3rd Ser. No. 17. pp. 884-892. With 2 figs. [Refs. in footnotes.]

The case reported is that of a woman 28 years of age in Algeria. A cure was effected by three 8-day courses of neostibosan the dose being 0.3 gm. a day given intravenously. Prior to the institution of specific treatment a detailed study of the blood was carried out and the results obtained with the albumin and globulin contents are in agreement with those of LLOYD, NAPIER and PAUL working in Calcutta [see this *Bulletin*, Vol. 26, p. 744].

C. M. W.

SORGE (Giuseppe). Ancora sul Kala-azar giovanile nostrano. [**K.A. in Young Adults in Sicily.**—Reprinted from *Minerva Med.* 1931. Apr. 14. Year 22. Vol. 1. No. 15. 12 pp. With 1 chart. [Med. Clinic, Catania.]

In a previous note the author described 4 cases of kala azar in adults, which had been seen at the clinic in Catania between April and July 1929,

and expressed the opinion that the disease in adults was more common than had been suspected. In the present paper two further cases are recorded, both in young women, one 21 years of age and the other 16.

C. M. W.

CAMMARATA (Antonio). Contributo alla cura del kala-azar. [**Case of K.A. Recovery.**].—*Riv. Sanitaria Siciliana*. 1931. Apr. 15. Vol. 19. No. 8. pp. 594–595.

A case of kala azar in a child four years of age from Caltanissetta, Sicily. A cure was obtained by 12 intramuscular injections of stibonal, the doses varying from 0.25 to 1.5 cc. given at intervals of 5 days.

C. M. W.

CH'ENG (Chang Chi). **Cutaneous Amoebiasis resulting from a Ruptured Liver Abscess Coincident with Kala-Azar. Report of a Case.**—*China Med. Jl.* 1931. Apr. Vol. 45. No. 4. pp. 350–352.

The case described is one of kala azar complicated by amoebic abscess of the liver which ruptured through the abdominal wall producing a large area of ulceration in the discharge from which both *Entamoeba histolytica* and *Leishmania donovani* were found. The patient received injections of emetine and neostam while the wound was irrigated with eusol 3 times a day. In spite of an attack of pneumonic symptoms, which interrupted the course of neostam for a time, a good recovery was made.

C. M. W.

CHUNG (Hui-Lan). **An Early Case of Kala-Azar, possibly an Oral Infection in the Laboratory.**—*Nat. Med. Jl. China*. 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 617–621. [11 refs.] [Peiping Union Med. College, Peking.]

The case recorded is that of a young Chinese medical man who contracted kala azar after doing laboratory work involving the frequent handling of blood from squirrels suffering from the disease. On many occasions through neglect of precautions infective blood was taken into the mouth and it seems not improbable that the infection was acquired orally.

C. M. W.

ROTON & MESNARD. Un cas de kala-azar infantile observé à Saigon. [**Case of Infantile K.A. seen at Saigon.**].—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. July–Aug. Vol. 9. No. 7. pp. 511–515. With 1 text fig. & 1 folding chart.

This is the second case of kala azar to be observed in Tonking. In both cases the disease was acquired elsewhere, the first in China and the second on the south coast of France.

C. M. W.

CHODUKIN (N. J.), SOFIEFF (M. S.), SCHEVTSCHENKO (F. J.) & RADSIVILOVSKIJ (G. L.). Phlebotomus als Ueberträger von Hunde-Leishmaniose. [**Phlebotomus as Vector of Canine Leishmaniasis.**].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. July. Vol. 35. No. 7. pp. 424–434. With 2 text figs. [Uzbekistan San. Bact. Inst., & Military Vet. Labs., Tashkent.]

The authors describe attempts which they made in 1928 and 1929 to transmit leishmaniasis from dog to dog by allowing *Phlebotomus papatasi* to feed on the margins of sores on naturally infected dogs and then on healthy ones. None of these experiments succeeded. In 1930 the method of experimentation was modified. A dog with cutaneous lesions was placed in a flyproof cage but separated from contact with four healthy puppies which were in the same cage. All animals were carefully cleared of fleas before introduction. From

May 15 to August 15 wild sandflies, chiefly *P. papatasi* and *P. sergenti*, were introduced. Counts made from time to time showed that 30 to 70 flies were present on the gauze walls of the cage. In July two of the puppies died without showing any sign of infection but at the beginning of October one of the remaining puppies was seen to be suffering from an infiltration on the snout. A few days later the other puppy died without leishmania infection. On the same day the animal with the nasal swelling was examined. A small ulcer and three areas of infiltration were found. Smears from the granulations revealed large numbers of leishmania. Bone marrow obtained by trephining of the tibia revealed no parasites. Though it is admitted that the experiment leaves certain points undetermined it is concluded that it demonstrates that leishmaniasis is transmitted from dog to dog by sandflies.

C. M. W.

MACHATTIE (C.) & MILLS (E. A.) in collaboration with CHADWICK (C. R.). **Naturally Occurring Oriental Sore of the Domestic Cat in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Aug. 8. Vol. 25. No. 2. pp. 103-106. With 6 figs. on 1 plate. [3 refs.]

The authors, who have shown that oriental sore is of common occurrence in dogs in Baghdad and have also reported it in bears which were kept there in captivity, now describe the disease in two cats. The lesions occurred on the nose, eyelid and ear. An attempt to inoculate mice in the tail failed though strains from the dog similarly inoculated to mice produced a local infection in the tail with the presence of parasites in the spleen and bone marrow. The character of the lesions, the parasites from them and the cultural forms are shown in a series of photographs.

C. M. W.

ARIAS ARANDA (Carlos) & ROSA (A.). Existen localizaciones óseas en la leishmaniosis americana? [**Bone Lesions in American Leishmaniasis.**]—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 460-465. With 5 text figs. [Mission for the Study of Argentine Regional Pathology, Jujuy.]

By means of X-ray photographs the authors have been able to demonstrate that cutaneous ulcers due to leishmania are liable to produce a condition of osteitis in the bones which lie beneath them.

C. M. W.

MAZZA (Salvador) & ARIAS ARANDA (Carlos). Ensayos de tratamiento de la leishmaniosis americana por la "Fuadina". [**American Leishmaniasis treated with Fouadin.**]—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 449-459. With 11 text figs.

— & —. Fuadinversuche bei der amerikanischen Leishmaniose.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Oct. Vol. 35. No. 10. pp. 583-591. With 11 text figs. [Mission for the Study of Argentine Regional Pathology, Jujuy.]

The paper gives an account of 3 cases of muco-cutaneous leishmaniasis which were successfully treated in the Argentine with intramuscular

injections of Fouadin. The rapidity with which healing of the lesions of the mucous membranes took place was remarkable. The two adults received 1.5 cc. and 3.5 cc. for the first two injections, subsequent doses being 5 cc. These caused neither pain nor local disturbance. One patient received 32 injections during two months and six days and the other 10 injections in hospital and 7 further ones at home. The remaining case was in a child nine years of age. Treatment with intravenous stibosan was given at first but was replaced by Fouadin of which two courses of 10 intramuscular injections were given, the maximum dose being 3.5 cc.

C. M. W.

WARMA (J. D.). **Oriental Sore.**—*Indian Med. Gaz.* 1931. July. Vol. 66. No. 7. pp. 383–388.

In the treatment of oriental sore, of which the author has had considerable experience in the Punjab, he has had good results with carbon dioxide snow but considers that the best results are obtained by local injections of berberine sulphate solution. He considers that if the sore shows signs of sepsis or acute inflammation these should be treated before specific treatment is instituted.

C. M. W.

FERRADAS (Manuel G.) & TOSCANO (Juan M.). Un caso de leishmaniosis cutánea y visceral. [**Case of Leishmaniasis both Dermal and Visceral.**]—*Medicina Países Cálidos*. Madrid. 1931. July. Vol. 4. No. 4. pp. 327–332. With 2 figs. & 1 chart in text. French summary (4 lines).

The case is that of a child who was admitted to the antimalaria dispensary at Camporredondo in Spain on account of suspicious symptoms noted during the taking of a spleen index of an infant population. Puncture of the enlarged spleen revealed leishmania. On the left cheek there was a scar said to be the result of a sore which had commenced as a spot nine months before. It reached the size of a five centime piece, was covered by a dark scab and was surrounded by an inflamed area. It lasted about 3 months. Coincidentally with the healing of the sore the child, who had been in good general health, became ill and its abdomen enlarged. After discovery of leishmania in the spleen treatment with neostibosan was commenced. During treatment the tissues round the scar on the cheek became inflamed but this reaction subsided in a short time. It is concluded from the history of the sore on the cheek that it was leishmanial in nature, and that the child had suffered from both oriental sore and kala azar.

C. M. W.

SINDERSON (H. C.). **Lupus vulgaris and Oriental Sore.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 75–76. With 1 plate.

The author describes a case of oriental sore in which cicatrization occurred, but was complicated by the appearance in the scar, particularly at its periphery, of nodules of lupus vulgaris. A photograph illustrates the condition of the lesion on the left cheek and nose of the patient, who was a boy aged 10 years. A secondary tuberculide is fairly common amongst young children in Baghdad and mention is made of one family in which 4 out of 5 children suffered from oriental sore complicated by lupus vulgaris. The author has not seen the condition in an adult nor in a European child.

C. M. W.

DE CASTRO (A. Bayley). **Notes on Oriental Sore.**—*Indian Med. Gaz.* 1931. July. Vol. 66. No. 7. pp. 391–392. [Military Families' Hosp., Hyderabad.]

The author records the good results he has obtained in the treatment of nine cases of oriental sore by local infiltration of the sores with a 1 per cent. solution of berberine sulphate.

C. M. W.

COLONIEU (L.). Sur un cas de boutons d'Orient multiples contractés dans l'Atlas marocain. [**Case of Multiple Oriental Sores contracted in Morocco.**]—*Arch. Inst. Pasteur d'Algérie.* 1931. Mar. Vol. 9. No. 1. pp. 13–14. With 1 plate.

The record of a case of oriental sore in which five distinct lesions occurred. It is the first case to be recorded from the district of Azilal in Morocco.

C. M. W.

ARTAMONOV (A. S.). [**Case of Leishmaniasis of the Mucous Membrane.**]—*Trop. Med. & Vet. Moscow.* 1930. Vol. 8. No. 10. pp. 1–2. With 2 figs. [In Russian.]

The author describes a case of leishmaniasis observed in a native of Turkestan. The lower lip was swollen and its mucous membrane covered with numerous minute purulent ulcers; an examination of the material taken from these revealed leishmania. The forehead bore marks of healed oriental sore.

C. A. Hoare.

MAZZA (Salvador) & DE LOS RÍOS (Miguel). Leishmaniosis oriental de forma no común observada en Jujuy. [**Dermal Leishmaniasis seen in the Argentine.**]—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 445–448. With 1 text fig. & 1 coloured plate.

A case of oriental sore in a Lebanon Syrian, who had a typical lesion on the bridge of the nose when seen nine months after the commencement of the disease as a small vesicle during the voyage from Algiers to the Argentine.

C. M. W.

BORREGO (Camilo) & CAMPO POSADA (Arturo). Leishmaniosis cutanea de formas ulcerosa simple y nodular-ulcerosa. [**Case of Dermal Leishmaniasis both Ulcerative and Nodular.**]—*Rev. Méd. Colombia.* Bogotá. 1931. July. Vol. 1. No. 12. pp. 791–797. With 3 text figs.

The paper describes a case of cutaneous leishmaniasis in Colombia in which there were several lesions, some of the simple ulcerative type and others of the nodular type. Treatment was successful with intramuscular injections of Fouadin in doses of 5 cc.

C. M. W.

CHAILLOT (L.) & SAUNIE (L.). Observation d'un cas de leishmaniose canine cutanée rappelant le bouton d'Orient. [**Case of Canine Leishmaniasis recalling Oriental Sore.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 535–538. [6 refs.]

The case referred to was one of a dog which had been imported to Beirut from France two years before. When seen by the author it was suffering

from ulceration of both ears. Microscopical examination of smears of the exudate revealed abundant leishmania.

C. M. W.

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- BROSIUS (O. T.). Dermal Leishmaniasis.—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 107-108. [United Fruit Company Hosp., Almirante, Panama.]
- CROVERI (Paolo). La leishmaniosi infantile in Piemonte. Un nuovo caso osservato in Torino.—*Arch. Ital. Sci. Med. Colon.* 1931. June 1. Vol. 12. No. 6. pp. 326-335. With 1 text fig. [3 refs.] English summary (7 lines). [General Med. Clinic, Univ., Turin.]
- MAZZA (Salvador) & ARIAS ARANDA (Carlos). Formas verrucosas de leishmaniosis americana.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 470-475. With 6 text figs. [Mission for the Study of Argentine Regional Pathology, Jujuy.]
- PASCAL (J. M.). Sur l'existence du bouton d'Orient à Ouargla.—*Arch. Inst. Pasteur d'Algérie.* 1931. Mar. Vol. 9. No. 1. pp. 15-16. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]
- POMA (Carlos S.). Sobre un caso de leishmania americana del ingenio Concepción de Tucumán.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 466-469. With 2 text figs.
- WILLOUGHBY (Hugh) & ASLETT (Edward). The Symptomatology, Differential Diagnosis and Treatment of Kala-Azar.—*Jl. Roy. Nav. Med. Serv.* 1931. July. Vol. 17. No. 3. pp. 189-194. With 2 charts in text.

MEDICAL ZOOLOGY.

REICHENOW (E.). Die pathogenetische Bedeutung der Darmprotozoen des Menschen. [**The Pathogenous Significance of the Intestinal Protozoa of Man.**].—*Zent. f. Bakt.* I. Abt. Orig. 1931. Vol. 122. No. 1/3. Beiheft. pp. 195*–212*. [28 refs.]

A general reviewal of present knowledge of the subject, from which the author concludes that hitherto no species of flagellates and, except *Entamoeba histolytica*, no species of amoebae has been really proved to be pathogenous. Many pathological states of the intestine encourage settlement of some of these species, and it is quite possible—but none the less not certainly known—that their mass-proliferation might affect the course of the malady unfavourably. Even *E. histolytica* for the most part is harmless and usually becomes virulent and a tissue parasite under predisposing conditions that affect the host as a rule in warm climates. Of other intestinal protozoa that infest man *Balantidium coli* and certain Coccidia are pathogenous, but the former may live in the human gut, as it does in the swine, without injury to the host and must require some predisposing or contributory condition in the host to become a tissue parasite; and Isospora, as in the case of laboratory infection described by CONNALL, may come and pass away without any symptoms of disease.

A. Alcock.

LABBÉ (Marcel), NEPVEUX (F.) & NICHITA. Les parasites intestinaux dans la pathologie du tube digestif. [**Intestinal Parasites in the Pathology of the Digestive Tube.**].—*Arch. des Malad. de l'Appareil Digestif.* 1931. Apr. Vol. 21. No. 4. pp. 401–425. [23 refs.]

There is nothing entirely novel either in the statistics of stool examinations, or in the nature of the inferences from them, that are set forth in this paper. The authors, of their own experience, confirm the opinion that the mere discovery of parasites in a stool does not necessarily justify immoderate exaggeration, yet are convinced of the pathogenic significance of intestinal parasites—protozoa and helminthes—when their presence in the stools is carefully correlated with the history and course of clinical observation of gastro-intestinal complaints. They are convinced, in short, that, with this stipulation, energetic treatment of parasitic infestations of the intestine can considerably reduce infantile mortality and adult morbidity. The protozoon and helminth parasites specified in the statistics here reported and cited are those which a profusion of evidence has now made familiar.

A. A.

HAKKI (Ismail). Examen parasitologique des selles en Turquie. [**Intestinal Parasites in Turkey.**].—*Rev. Méd. et Hyg. Trop.* 1931. May–June. Vol. 23. No. 3. pp. 127–129. [1 ref.]

The results of examination of stools from 800 individuals in Constantinople and various districts of Turkey are as follows:—Protozoa: *Entamoeba coli* cysts in 6·25 per cent.; *E. dysenteriae* cysts, 3·75; *Chilomastix mesnili*, 2·5; *Trichomonas intestinalis* 4·37; *Giardia intestinalis*, 7·5. Neither Coccidia nor Balantidium.

Blastocystis hominis, 8·75 per cent. No spirochaetes.

Eggs of Helminthes: *Hymenolepis nana*, 3.12 per cent.; *Diphyllanthium latum*, 6.25; *Dipylidium caninum*, 0.62; *Fasciola hepatica*, 0.62; *Dicrocoelium dendriticum*, 1.25; *Ascaris lumbricoides*, 18.75; *Enterobius vermicularis*, 22.5; *Necator americanus*, 3.75; *Ancylostoma duodenale*, 0.62; *Strongyloides stercoralis*, 2.5; *Trichuris trichiura*, 22.5. *Taenia saginata* has frequently and *T. solium* has rarely been observed.

The stools were from children above 5 years and adults, some healthy, but the majority with nervous or digestive trouble.

A. A.

GUILLINY (R.). Le parasitisme intestinal dans la province de Vahomandry (Madagascar). [**Intestinal Parasites in the Province of Vahomandry (Madagascar).**]—*Marseille-Méd.* 1931. Jan. 25. Vol. 68. No. 3. pp. 124-128.

Struck with the frightful native anaemia prevalent in the province of Vahomandry the author set to work to examine the stools of the people—men, women, and children of all ages. Here are the results seen in 227 stools (after concentration).

Hookworm, either *Ancylostoma* or *Necator*, in every one. *Ascaris* in 175. Whipworm in 196. Threadworm in 7. *Strongyloides* in 2. *Schistosoma mansoni* in 64. *Taenia* in 3. *Entamoeba coli* cysts in 32. *Giardia* cysts in 7. *Trichomonas* in 1. Quadruple infestations in 60; triple in 107; double in 43; quintuple in 12. Even native children less than two years old had intestinal parasites, and even European children of no long residence. In six of the stools a common food-mite, *Tyroglyphus*, was present.

A. A.

TSUCHIYA (H.). Incidence of Protozoan Infections of Intestinal Tract among Children in Saint Louis.—*Proc. Soc. Experim. Biol. & Med.* 1931. Apr. Vol. 28. No. 7. pp. 709-710. [Med. School, Washington Univ., St. Louis, Mo.]

A comparison of incidence of protozoan infections among 362 white children in different states of environment and health, namely (a) 164 healthy inmates of two orphanages, (b) 156 inmates of convalescent homes, and (c) 42 sufferers from various acute maladies. The incidence was highest in one of the two (a), and lowest in (c). Of the whole 362 children 33 per cent. were infected with one, 10 per cent. with two and 3 per cent. with three species. The ages of the children ranged from 1 to 16 years, and infection was highest in those of 7 to 9 years and lowest between 1 and 3 years, and higher among boys than girls. The incidence of *Giardia lamblia* was highest; of *Trichomonas hominis* lowest.

A. A.

THOMSON (J. Gordon). The Question of Immunity in Man to Protozoal Diseases.—*Proc. Roy. Soc. Med.* 1931. Feb. Vol. 24. No. 4. pp. 499-510. (Sect. Trop. Dis. & Parasit. pp. 9-20). With 1 chart in text. [1 page of refs.]

This is a valuable epitome, with solid foundations and fortification in bibliography, of the modern Pilgrim's Progress towards light for

them that still sit in darkness on the subject of man's resistance to four protozoal diseases—malaria, trypanosomiasis, kala azar and amoebiasis. Being a digest of recorded fact it cannot be summarized to any advantage, and its purport can be shown in the author's own conclusions.

[It is evident, from the discussion that followed the address, that a statement got afloat that the great LIVINGSTONE was immune to malaria. LIVINGSTONE, himself an M.D., writes in his book on *Missionary Travels and Researches in South Africa* (1861) p. 332 [after his twenty-seventh attack]: "It is true that I suffered severely from fever . . . compelled to sleep on the damp ground month after month, exposed to drenching showers, and getting the lower extremities wetted two or three times a day, living on manioc roots and meal, and exposed during many hours each day to the direct rays of the sun with the thermometer standing above 96° in the shade." His first attack of "fever" (in 1853) is described in p. 132, as due to "malaria and watery vapour."]

"*Conclusions.*—(1) In the four protozoal diseases of man briefly discussed, namely, malaria, trypanosomiasis, kala-azar and amoebiasis, there is definite evidence of a natural resistance to infection. Some individuals may be completely refractory to an infection, but the most common type of immunity seems to be a natural tolerance associated with the presence of parasites in small numbers.

"(2) This resistance or natural tolerance may from various causes be completely broken down. The first acute manifestations of an infection often date from some cause which lowers the general body resistance.

"(3) A definite acquired immunity or more correctly an acquired tolerance depending on the presence of parasites in small numbers can be brought about by continuous and repeated infections as is well illustrated in malaria and trypanosomiasis and to a less extent in leishmaniasis and amoebiasis. Again, this acquired immunity can be easily broken down if reinfection is interrupted for a considerable period. Any debilitating cause may also bring about loss of resistance.

"(4) Little is known of the characters of natural or acquired immune bodies. Natural immunity depends upon some unknown properties in the normal serum, and from recent observations of Yorke, Adams and Murgatroyd would seem to be dependant on such factors as diet. These immune substances become less or disappear from the serum in certain pathological conditions of the body.

"(5) In acquired immunity, on the other hand, antibodies of an unknown nature seem undoubtedly to be formed, but these are either unstable or quickly eliminated from the body after complete disappearance of the parasites. In other words, this acquired immunity seems to depend to a large extent on the continued presence of a low infection with parasites. It seems further, to depend upon more or less continued inoculation with fresh strains of parasites and if this continued inoculation is interrupted for a considerable period the immunity is broken down. Any debilitating cause can also bring about loss or resistance.

"(6) Practical methods of passively immunizing man are at present of little value. The use of vaccines or antisera in treatment requires further observations.

"(7) It would seem, however, that the important observations already made on natural resistance and acquired immunity to these infections open up a hopeful field to research workers, because, if one could find the factors or biochemical properties influencing refractoriness to infection, it might be possible to protect individuals either completely from infection or from the ravages of acute infestation."

A. A.

RATCLIFFE (Herbert L.). **Di-Hydranol (2-4-Dihydroxyphenyl N-Heptane) in the Treatment of Infections with Intestinal Protozoa.**—*Amer. Jl. Trop. Med.* 1931. July. Vol. 11. No. 4. pp. 285-292. [6 refs.] [Med. School, Univ. of Pennsylvania, & Lab. of Comparative Path., Zool. Soc., Philadelphia.]

The author advances dihydranol as promising "to be an effective non-toxic remedy that can be used in treating flagellate, amoebic or ciliate infections with a high degree of success". He mentions cases in which it was used by FAUST, with success against *E. histolytica* and some other infestations, but not always against *E. coli*, *Chilomastix*, and *Giardia*, and also cases reported by DAVID and LEAKE in which 0.6 gm. per kilo. of body-weight was fatal for guineapig. In his own experiments, using a solution in olive oil, and a suspension in friable agar blocks, the drug was "effective in clearing up infections with pathogenic amoebae and ciliates in monkeys, and in ridding man and monkeys of intestinal protozoa of lesser importance". Dosage for monkeys ranged from 3.5 to 6 gm. and for man 9 to 15 gm.

A. A.

- i. TANABE (Misao), KUWABARA (Naonori) & CHIBA (Eiichi). **On the Cultivation of *Entamoeba coli* in Tanabe and Chiba's Medium.**—*Keijo Jl. of Med.* 1930. May 20. Vol. 1. No. 2. pp. 91-93 (21-23). [4 refs.]
- ii. CHIBA (Eiichi) & KUWABARA (Naonori). **On the Pathogenicity of *Entamoeba histolytica* cultivated in Tanabe and Chiba's Medium.**—*Ibid.* pp. 94-98 (24-28). [15 refs.] [Parasit. Dept., Keijo Imperial Univ., Chosen, Japan.]

i. In Tanabe and Chiba's medium two strains of *Entamoeba coli* grew luxuriantly, persisting as long as 12 days; the strains have been maintained for 168 and 170 generations. The amoebae encysted in it and the cysts hatched in it quite easily.

ii. Six strains of *E. histolytica* from acute dysentery stools grown in Tanabe and Chiba's medium, and regularly subcultured in it for 15 to 202 days, demonstrated infectivity and typical pathogenic results for kittens. The authors therefore conclude that ingestion of rice-starch by *E. histolytica* does not inhibit pathogenicity.

Tanabe and Chiba's medium is made as follows: Agar slants (10 gm. agar, 1 gm. asparagin, 1,000 cc. Ringer solution) are covered with Ringer solution containing 5 per cent. rabbit serum, or with a mixture of 8 parts Ringer solution and 1 part horse serum; before insemination 2 or 3 loopfuls of sterilized (160°-180° C.) rice starch are added to the liquid part of the medium.

A. A.

KOCH (Dorothy Ann). **Infection with *Craigia*. Report of Case.**—*California & Western Med.* 1931. Apr. Vol. 34. No. 4. pp. 277-278. With 2 text figs. [4 refs.] [Pacific Inst. of Trop. Med., Univ. of California, San Francisco.]

During routine examination of faeces from a patient in hospital organisms identified as belonging to the genus *Craigia* were discovered on a single occasion in films which had been stained. The organism figured has an

average diameter of 6.6 microns, possesses a nucleus with large irregularly shaped karyosome and vacuolated cytoplasm containing a few deeply staining granules. It is stated that many forms showed a blepharoplast but in none was a flagellum seen. In the absence of a flagellum the identification of a granule as a blepharoplast must be open to question. The figures show nothing which could be so identified; they bear a striking resemblance to *Endolimax nana*. The evidence on which the diagnosis is based is so slender that the paper can hardly be regarded as contributing to our knowledge of *Craigia*.

C. M. Wenvon.

NUZUM (Franklin R.), ELLIOT (Albert H.) & PRIEST (Blanche V.). **Flagellate *Trichomonas hominis* in the Rabbit—its Pathogenicity. Report of an Instance of Infestation in Man, with Necropsy Findings. Report of Case.**—*California & Western Med.* 1931. July. Vol. 35. No. 1. pp. 19–21. [26 refs.] [Cottage Hosp., Santa Barbara.]

The authors are acquainted with what has been written about *Trichomonas hominis*, and they describe their experiments with rabbits, in some of which the animals undoubtedly became infected with this parasite and showed after death solely minute superficial ulceration in the rectum; but they could not find any evidence of tissue-invasion by the parasite. They also describe a case in a constipated male child (white) of 2 years and 10 months with a previous history of muco-sanguineous dysentery and fever, a present condition of fever, weakness and heavy *T. hominis* infestation, a clinical diagnosis of "septicaemia, secondary anaemia, chronic tonsillitis, otitis media", and a long list of post-mortem phenomena none of which (except, possibly, numerous peculiar small brownish-pink spots on the serosa of the large gut) suggested the intervention of the *Trichomonas*. The authors are "forced to conclude that *Trichomonas hominis* is not pathogenic in the rabbit"; and they state, furthermore, that careful post-mortem study of the child warrants them "in reporting the absence of any evidence of tissue-invasion" by the parasite. Nuzum's personal opinion is "that *Trichomonas hominis*, at least in most instances, is nonpathogenic for man."

A. A.

MCCLENDON (S. J.). **Giardiasis in Children. Report of Cases.**—*California & Western Med.* 1931. Apr. Vol. 34. No. 4. pp. 266–268. [10 refs.] [Rees-Stealy Clinic, San Diego.]

Experience of 22 cases of *Giardia* infection (in the course of routine examinations) in children from 2 to 15 years old has convinced the author that the organism is pathogenous. Besides such immediate symptoms as abdominal pain and tenderness, nausea, flatulence, and constipation the author notes anorexia, nervous irritability, languor, headaches, and enuresis; and only one instance of diarrhoea. Treatment consists of a ten day's course of bismuth-salicylate followed in a week by a ten days' course of treparsol—this whole course to be repeated (if necessary to the fourth time) at a weekly interval between courses.

A. A.

FAUST (Ernest Carroll). **Habitat of Giardia in the Intestine.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Mar. Vol. 28. No. 6. pp. 621-623. [4 refs.] [Dept. of Trop. Med., Tulane Univ., New Orleans.]

It is customary, even among those who speak with authority, to talk of *Giardia* as seated in the upper part of the small intestine, mainly in the duodenum. Dr. Faust draws attention to the seats of *Giardia canis* in the intestine of the dog. In the majority of natural dog-infestations the prime seat of this organism (*G. canis*) is in the caecum and appendix; frequently it is also present in the colon and the rectum, occasionally in the last 10 cm. of the ileum, never in the higher levels of the intestine.

A. A.

TALIAFERRO (William H.), CANNON (Paul R.) & GOODLOE (Sara). **The Resistance of Rats to Infection with *Trypanosoma lewisi* as affected by Splenectomy.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 1-37. With 3 text figs. [26 refs.] [Dept. of Hyg. & Bact., & Path. Dept., Univ., Chicago.]

This is a very special investigation, the object of which is to discover whether or not the specific antibody that in the authors' opinion inhibits the proliferation of the parasite in rats infested with *T. lewisi* is formed chiefly in the spleen. The effects of splenectomy under various experimental conditions are studied and recorded in detail. The main conclusion is that splenectomy does not markedly influence the formation of this specific antibody in young healthy rats when the operation is performed at intervals from 7 days before to 41 days after infection provided the animals are free from Bartonella infection and certain other disturbing or disabling conditions mentioned. Infection with *T. lewisi* in Bartonella-free rats does however, cause a significant increase in size of spleen with a demonstrable increase in cellular activity.

A. A.

JIROVKE (Otto). Ueber das Vorkommen von blepharoplastlosen Trypanosomen in normalen Stämmen. [**Occurrence of Trypanosomes without Blepharoplasts in Normal Strains.**]—*Zent. f. Bakt.* I. Abt. Orig. 1931. May 28. Vol. 121. No. 1/2. pp. 55-58. [6 refs.] [Inst. for Ship & Trop. Hyg., Hamburg.]

The observations here recorded confirm the fact that individuals devoid of blepharoplast are found in all kinds of trypanosomes even in stocks long cultivated in laboratory animals. The percentage of such individuals varies from host to host, and often quite irregularly in the course of an infection.

A. A.

HUFF (Clay G.). **The Inheritance of Natural Immunity to *Plasmodium cathemerium* in Two Species of *Culex*.**—*Jl. Preventive Med.* 1931. July. Vol. 5. No. 4. pp. 249-259. With 2 text figs. [7 refs.] [Dept. of Hyg. & Bact., Univ., Chicago.]

In earlier papers on this subject (see this *Bulletin*, Vol. 27, p. 892, and Vol. 28, p. 507) the author described his experimental procedure and results showing that for *Culex pipiens* and *C. quinquefasciatus* susceptibility and insusceptibility to bird-malaria (*Plasmodium cathemerium*) were inheritable characters within the species, since selection from the progeny from females susceptible to that infection tended to increase and selection from the progeny from non-susceptible females tended to decrease the percentage of susceptible individuals in the succeeding generations. In the present paper, these observations

are confirmed and a genealogical table of *Culex pipiens* is given diagrammatically in which susceptibility to *P. cathemerium* is explained as a Mendelian recessive character.

A. A.

BOVET (Daniel). La durée du cycle schizogonique du *Plasmodium praecox*. [**The Duration of the Schizogonic Cycle of *Plasmodium praecox*.**]—*C.R. Soc. Biol.* 1930. Nov. 4. Vol. 105. No. 29. pp. 302-304. With 1 graph in text. [5 refs.]

Canaries were infected with a strain of *P. praecox* originally obtained in 1902 by the Sergents and subsequently maintained in canaries and *Culex pipiens*. It has been the subject of numerous researches under the name of *P. relictum*. The blood of the canaries was examined every three hours over a period of 50 hours, and it was found that there was a regular cycle of 12 hours duration, whereas the cycle of *P. cathemerium*, another bird parasite, lasts 24 hours. The escape of the merozoites into the blood is not accompanied by fever, such as occurs in human malaria.

W. Fletcher.

GREEN (Richard T. B.). **A Malarial Parasite of *Macacus cynomolgus* and its Development in Mosquitoes. (Preliminary Note).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Apr. 25. Vol. 24. No. 6. pp. 649-650. [Inst. for Med. Research, Kuala Lumpur, F.M.S.]

This malaria parasite, discovered by McSWAN in the Malay *Macacus cynomolgus* (2 individuals), has some resemblance to *Plasmodium vivax*. "In certain features it corresponds with descriptions of *Plasmodium kochi* of African monkeys (*Cercopithecus*) and in others with those of *P. inui* in Borneo monkeys (*Macacus*)." Inoculated from monkey to monkey, pyrexia occurred on the 3rd or 4th day; small rings in the blood on the 5th or 6th day, large trophozoites and young gametocytes on the 7th or 8th day, fully developed gametocytes on the 8th or 9th day; and the spleen became palpable from the 9th to the 13th day. Few symptoms beyond pyrexia and anaemia are shown in *M. cynomolgus*, and although the blood remains infected for months the animals do not seem to lose condition. The monkey-lice were free from infection.

Anopheles maculatus Theob. and *A. kochi* Don. took the infection (sporozoites), also *A. vagus* Don. (only oocysts so far). (Infection experiments with *Culex quinquefasciatus*, *Armigeres obturbans*, and *Stegomyia albopicta* were constantly negative). Large oocysts were observed in one *A. kochi* 9 days after the infective feed. In appearance and rate of growth oocysts were indistinguishable from those of *P. vivax*. Sporozoites were plentiful in the salivary glands by the 16th day; they could not be distinguished from those of the human malaria parasites—a warning to those who find *Anopheles* naturally infected.

A. A.

LITTLE (C. J. H.). **A Note on *Balantidium coli*.**—*Jl. Roy. Army Med. Corps.* 1931. Apr. Vol. 56. No. 4. pp. 298-299.

The purport here is to illustrate by deliberate experiment the rapid degeneration of *Balantidium coli* in a standing stool in India, the temperature of the laboratory being 80° F. and the atmosphere moist.

A stool brought for examination about an hour after it had been passed was found to be swarming with active forms of this parasite. When the stool had been kept for another hour a second cover slip preparation was made from it; in this delayed preparation only a few sluggish parasites could be found surviving at one spot, the others being represented by ghostly vacuoles some of which contained disintegrated remains. The experiment, as the author thinks, may justify the opinion that balantidiasis may often be overlooked.

A. A.

PICON (Raul R.). *L'infection par l'Hemogregarina hominis*. [**Case of *H. hominis* Infection.**]—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1931. May. Vol. 2. No. 5. pp. 495-501. With 1 text fig. & 2 coloured figs. on 1 plate. [Faculty of Med., Lima.]

This paper, illustrated with a text figure and coloured plate, deals with an organism seen in a blood film during life and subsequently in large numbers in sections and smears of the liver and spleen post mortem in a patient in Peru. The organism, which is regarded as a haemogregarine, occurs in a variety of forms; some are pear shaped with a single small red staining dot, others are ovoid while yet again others are filamentous and measure 20 to 30 microns in length by 3 to 5 microns in breadth. The long forms have several red staining dots. Though the organism does not bear the slightest resemblance to any known haemogregarine it is identified with KREMPF'S "*Haemogregarina hominis*" which similarly had nothing in common with these parasites. It is fortunate that the paper is so well illustrated for it enables the reviewer to state with certainty that the organism is of a vegetable nature.

C. M. Wenyon.

BUXTON (Patrick A.). **The Measurement and Control of Atmospheric Humidity in Relation to Entomological Problems.**—*Bull. Entom. Res.* 1931. Sept. Vol. 22. Pt. 3. pp. 431-447. With 9 text figs. [23 refs.] [School of Hyg. & Trop. Med., London.]

This is a discourse on the measurement and control of humidity under set conditions in experimental entomology. It is partly descriptive of hygrometers and hygroscopic substances and solutions, and partly commentative and illustrative of their varied employment and efficiency. It includes much that is common knowledge in physics but is thought to be insufficiently appreciated in biology. It concludes with a valuable list of works on the measurement of humidity and of reports and studies on the influence of relative humidity on the vitality of particular insects of experiment. As the author states, it is not a paper that can be summarized.

A. A.

SMITH (Roger C.). **A Study of Temperature and Humidity Conditions in Common Types of Insect Rearing Cages.**—*Jl. Agric. Res.* 1931. Sept. 15. Vol. 43. No. 6. pp. 547-557. With 1 fig. [7 refs.]

This paper, which consists mainly of description and discussion of methods and apparatus for the study of insects in enclosed spaces

under controlled conditions of humidity, is too severely technical to be summarized. It has a page of illustrations of a dew-point apparatus, a psychrometer of original design, and other instruments convenient for determining relative humidity within insect-cages, and also a list of references to useful literature under this heading.

A. A.

BUXTON (P. A.). The Law governing the Loss of Water from an Insect.—Reprinted from *Proc. Entom. Soc. London*. 1931. July 10. Vol. 6. Pt. 1. pp. 27–31. With 2 text figs. [6 refs.]

Dealing with experimental work on insects in the laboratory the author reminds us of the important difference between "relative humidity" and "saturation-deficiency"; that, other things equal, the rate of evaporation from an open surface is almost directly proportional to the saturation-deficiency; and that this "law," subject to certain modifications, applies to mammals and to leaves of plants. He would like to know whether it applies also to insects with their chitinous protection, and from analysis of the records of some other writers on the subject of insects exposed to a range of combinations of temperature and humidity he concludes that "the law of saturation-deficiency applies, within certain temperature limits, both to eggs and to adult insects of several different orders." The author quotes among others, BACOT and MARTIN who showed that the duration of life of adult *xenopsylla cheopis* was directly proportional to saturation-deficiency in a number of experiments conducted at one temperature, but at different conditions of humidity; but that at very high humidities the proportion broke down.

A. A.

HOEPLI (R.) & FENG (L. C.). Histological Reactions in the Skin due to Ecto-Parasites: *Dermacentor sinicus* P. Schulze from Hedgehog, *Haemaphysalis campanulata hoepliana* P. Schulze from Dog, *Cimex lectularius* and *Pediculus vestimenti* from Man.—*Nat. Med. J. China*. 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 541–556. With 8 figs. (2 coloured) on 4 plates. [15 refs.] [Peiping Union Med. College, Peking.]

Histological changes seen in the skin of laboratory animals (guinea-pig, etc.) removed after suffering the close attentions of the two species of ticks named above (and stained with haematoxylin-eosine) seem to have been as follows:—

The tissue all around the site of the tick's beak was characteristically transformed into a homogeneous eosinophile clot or mass irregularly permeating interstices in the corium; this mass was subsequently invaded by wandering cells, and ultimately (in one clear case) ended in a certain amount of necrosis; smaller similar masses or clots were sometimes found blocking the small neighbouring blood-vessels; beyond this the corium and perhaps the subcutaneous tissue was infiltrated with polymorphs, eosinophiles, and various other altered cells.

Subcutaneous injection of emulsions of salivary glands of these ticks caused more extensive local hyperaemia, oedema, and cell-infiltration, but the homogeneous eosinophile masses were never observed.

Subcutaneous injection of emulsions of both kinds of the salivary glands both of bed-bugs and of body-lice caused no appreciable histological changes in skin of laboratory animals; but in three human beings the implantation of the bean-shaped salivary glands of the louse in the skin resulted in an inflammatory papule, consisting of a small circumscribed vascular granulomatous mass of cells, with much perivascular cell-infiltration in the surrounding tissue; and in each case this local inflammation was con-

current with a malady that suggested "either a kind of atypical Trench Fever or an infection nearly related to it."

Much of the minutiae of the text is trivial rather than astonishing, but the well-executed plates of figures are helpful and valuable.

A. A.

MUKERJI (S.). "**Lacto-Chloral**": a New Clearing and Mounting Medium for the Rapid Observations of the Microscopical Structures of Small Insects.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 281-283. [7 refs.]

The author prescribes lacto-chloral above lactophenol as a clearing and mounting medium for microscopic examination of small insects. It is made of the following ingredients, mixed in the order given: chloral hydrate 0.5 gm., distilled water 1 cc., glycerine 1 cc., lactic acid *puriss.* 2 cc., glacial acetic acid 2 to 4 minims, formol 0.5 cc. Neither heating nor filtering is necessary, and it is as well to make fresh medium as required. A drop of the medium is placed in the hollow of a slide. The object is dropped into this drop and a cover-slip is applied. If the clearing, etc., is satisfactory (20 minutes) the preparation can be sealed for permanence.

A. A.

BRITISH MOSQUITO CONTROL INSTITUTE. **Report of the Director** [MARSHALL (J. F.)]. **Presented at the Fourth Annual General Meeting, held in the Rooms of the Entomological Society of London, 41 Queen's Gate, London, S.W., on the 9th December, 1930.**—16 pp. With 30 figs. Hayling Island, Hampshire, England.

The British Mosquito Control Institute is now a Corporation for "the furtherance of research and educational work in relation to the control of mosquitoes and other insects." Scientific Societies, Educational Bodies, Local Authorities, Clubs and other Associations may become "Collective" Members. This report, which is finely illustrated, describes some of the researches that have been published during the last few years, and gives some account of its educational work and methods and apparatus at home and of its lectures and demonstrations at scientific meetings in various other places.

A. A.

BATH (C. H.). **The Practical and Research Value of Mosquito Traps.**—*Amer. Jl. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 147-150. [Gorgas Memorial Lab., Panama.]

According to this author Sir Ronald Ross, in his book "Mosquito Brigades and How to Organize Them", was the first to use the term "mosquito-trap" to a combination of a sleeping man and a mosquito-net with some rents in it: the man acts as a bait and the mosquitoes getting in at the rents cannot get out again. Ross, however, did not follow up with a mosquito-trap baited with a man: in his book "The Prevention of Malaria" the mosquito-trap mentioned is a box lined with black cloth.

In the author's mosquito-trap the man is used as a bait, but he doesn't get bitten because he sleeps under a sound mosquito-net inside a mosquito-house the screens of which have valvular slits that

allow mosquitoes to creep into the mosquito-house but obstruct their escape. (Or the slit may open into a special inlet or entry having a narrowed outlet to the house). "In Miraflores the three largest catches made in one night" with a trap on these principles "were 1018; 473; and 414, all *Anopheles*" and "the total number of *Anopheles* counted in sixty days from six traps was 37,000". Elsewhere there resulted "a total catch of 49,496 *Anopheles* in the eleven traps in use in thirty-two days", and "the largest catch made in one trap in one night was 4,973 *Anopheles*."

"It is a good anti-malarial measure, since nearly all *Anopheles* that are attracted into the traps are females in search of a blood-meal with which to develop her eggs . . . I believe that mosquito traps [on these principles] will eventually be built into houses as an essential part of the screening on dwellings in unsanitated areas."

A. A.

SPIER (Alma Jane). **Compendium of the Parasites of Mosquitoes (*Culicidae*)**.—*Hyg. Lab. Bull. No. 146*. Wash. 1927. Mar. pp. iv+36.

This useful compendium of the parasites of mosquitoes includes, of course, not only parasites pathogenous to those insects but also the parasites transmitted by them to other animals, and the term "parasite" includes forms like *Vorticella* which take independent root on many freshwater organisms besides mosquito larvae, and catch their own food from the watery environment. The compendium with explanatory detail, fills 35½ pages, five of which contain a generic list, in biological precedence, of the parasites reported from mosquitoes, while twenty-nine are occupied by a list of the species of mosquitoes affected, with the parasites reported from each species.

A. A.

SHANNON (Raymond C.). **The Environment and Behavior of Some Brazilian Mosquitoes**.—*Proc. Entom. Soc. Washington*. 1931. Jan. Vol. 33. No. 1. pp. 1-27. [16 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

This is a very interesting account of the mosquitoes of the middle coast states (Bahia northwards to Rio Grande do Norte). A list of 86 species is given (compared with 188 in all Brazil and 550 in all America) and the larval habits of all but 7 of them are known. The 86 species include 15 anophelines, and among them the recently introduced common African species *Anopheles gambiae* (= *costalis*) which the author regards as almost vying with *Aedes aegypti* and *Culex 5-fasciatus* (= *fatigans*) in its intimate association with urban man. The list is followed by some comprehensive and well-informed considerations of mosquito environment and behaviour in nature and also as affected by man. There is a very full account of *Aedes aegypti*, and as illustrating the argument that it is essentially urban, the author states that when colonies of about 3,000 eggs and larvae and pupae were planted in wooded localities 3 kilometers distant from houses, adults were never seen in these rustic localities after the lapse of 2 weeks.

A. A.

SENEVET (G.). Contribution à l'étude des nymphes de Culicidae. Description de celles de certains anophélins et plus spécialement des espèces européennes et méditerranéennes. [**Contribution to the Study of Nymphs of Culicidae. Description of those of Some Anophelines and Especially of European and Mediterranean Species.**]—*Arch. Inst. Pasteur d'Algérie*. 1930. Sept.-Dec. Vol. 8. No. 3/4. pp. 297-382. With 48 text figs. [Pasteur Inst. of Algeria, Algiers.]

Authors generally, with a few recent exceptions, have disregarded the characteristic chaetotaxy in attempting the taxonomy of mosquitoes in the pupal stage. The author has carefully studied the disposition of the abdominal setae and spines, segment by segment, from the paddles forwards, in the pupae of 23 species of *Anopheles* and here sets forth and generalizes the results in descriptions and large clear text-figures with two provisional keys, one for the discrimination of 12 European and Mediterranean species, the other including 30 species in a wider distribution.

A. A.

SENEVET (G.). Contribution à l'étude des nymphes d'anophélins (2e mémoire). [**Contribution to the Study of Anopheline Nymphs. Part 2.**]—*Arch. Inst. Pasteur d'Algérie*. 1931. Mar. Vol. 9. No. 1. pp. 17-112. With 57 text figs. [5 refs.] [Pasteur Inst. of Algeria & Faculty of Med., Algiers.]

Tabulated detail of the specific superficial characters of 22 species and 3 varieties, along with a provisional key for the determination of anopheline nymphs, and 57 text figures. The author points out that 4 species described by Root (*Amer. Jl. Hyg.* 1926, Vol. 6, p. 684) were inadvertently omitted from Part I of his descriptive catalogue.

A. A.

DAVIS (Gordon E.) & PHILIP (Cornelius B.). **The Identification of the Blood-Meal in West African Mosquitoes by Means of the Precipitin Test. A Preliminary Report.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 130-141. [17 refs.] [Yellow Fever Labs., Internat. Health Division, Rockefeller Foundation, Lagos.]

This paper contains a short account of the precipitin test and the authors' technique and statistics of results in its application to the identification of the blood ingested by large numbers of West African mosquitoes of 26 species. Two common house-haunting species *Mansonia africanus* and *Anopheles gambiae* were positive for human blood only—the first in 195 of 210 tests, the second in 154 of 188. Of 8 species of *Aedes* tested all were occasionally positive for human blood. The other species sometimes found positive for human blood were *Anopheles funestus*, *A. pharoensis*, *Culex grahami* group, and *C. thalassius*. The common *Culex nebulosus* was positive for chicken blood only in 38 of 54 tests. "It is significant that no cross-reactions were observed."

A. A.

MATHESON (Robert) & HINMAN (E. H.). **Further Work on *Chara* spp. and Other Biological Notes on Culicidae (Mosquitoes).**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 99-108. [5 refs.] [New York State College of Agric., Cornell Univ., Ithaca.]

Experiments with *Chara vulgaris* and other local species. From observations here described the authors conclude that it is the effect of continuous bombardment by the tiny bubbles of oxygen discharged

by Chara that makes life impossible for the mosquito larva. The larvae can live to maturity with Chara grown in darkness, but not at all with Chara growing in sunlight. This bombardment can be effected mechanically, in water free from Chara, by forcing the stream of bubbles through reversed Berkefeld candles. The authors are satisfied that Chara is not "toxic." Incidentally they noticed Hydra capturing mosquito larvae.

A. A.

WIGGLESWORTH (V. B.). **The Formation of the Peritrophic Membrane in Insects, with Special Reference to the Larvae of Mosquitoes.**—Reprinted from *Quarterly Jl. Microscop. Sci.* 1930. May. Vol. 73. Pt. 4. pp. 593–616. With 10 text figs. [25 refs.]

This interesting entomological paper, which is liberally illustrated by instructive figures in the text, describes the formation of the peritrophic membrane in the larvae of mosquitoes, and traces how it is formed in the same general way in other Diptera and in most of the main orders of insects that have been examined. In all chitin formed the basis of the peritrophic membrane.

A. A.

HECHT (Otto). Ueber den Wärmesinn der Stechmücken bei der Eiablage. [**The Temperature-Sense of Parturient Mosquitoes.**]—*Riv. di Malarologia.* 1930. Nov.–Dec. Vol. 9. No. 6. pp. 706–724. With 3 text figs. [13 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

In the deposit of its eggs the temperature of the water in the author's experiments was for *Anopheles maculipennis* never above 32°–34° C., seldom under 20° C., exceptionally under 15° C.; for *A. bifurcatus* 12°–20° C.; and for *Aedes aegypti* between 20° and 30° C.

A. A.

HAMLIN-HARRIS (R.). **Mosquitos breeding in Tree Cavities in Queensland.**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 51–52. [Health Dept., Brisbane City Council, Brisbane.]

Two lists of local trees (both indigenous and exotic) in which rot-holes occur; in one list mosquitoes have been found breeding in the holes, in the other not. Unless the suitable tree is growing near dwelling places *Aedes argenteus* and *Culex fatigans* do not use it. In the bush the mosquito that commonly uses tree-holes is *Ae. notoscriptus*.

A. A.

LEGENDTRE (J.). Le moustique cavernicole ou l'adaptation de "*Culex pipiens*" à l'urbanisme moderne. [**The Cave-Mosquito; or the Adaptation of *Culex pipiens* to Urban Life.**]—*Bull. Acad. Méd.* 1931. Year 95. 3rd Ser. Vol. 106. No. 28. pp. 86–89.

In certain quarters of a certain city in the west of France that are annually infested by mosquitoes (*C. pipiens*) these insects do not breed much in the waters of the park among the little fishes, but in stagnant pools in certain dark caves, and in underground cisterns and cesspools.

A. A.

MAGROU (J.), MAGROU (M.) & ROUBAUD (E.). Action stimulante à distance, exercée par certaines suspensions bactériennes, à travers le quartz, sur l'éclosion du moustique de la fièvre jaune. [**The Stimulating Action exercised at a Distance by Certain Bacterial Suspensions, across Quartz, on the Hatching of the Yellow Fever Mosquito.**—*C.R. Acad. Sci.* 1931. May 4. Vol. 192. No. 18. pp. 1134-1136. [2 refs.]

It is well known that eggs of *Aedes aegypti* containing larvae ready to hatch, may remain dormant for long periods in the absence of certain stimuli [see this *Bulletin*, Vol. 27, p. 497]. The authors have made the very interesting observation that 24 hour cultures of *B. tumefaciens*, or 8 hour cultures of *Staphylococcus aureus*, will produce the hatching of the larvae when separated from the water containing the ripe eggs, by means of a quartz plate. The emanations from the cultures of *B. tumefaciens* caused 31 out of 194 eggs to hatch in 24 to 48 hours, whilst out of 203 eggs kept as controls at the same temperature none hatched. Similarly, out of 78 eggs exposed to the emanations from *Staphylococcus* 7 hatched in 24 hours, whilst of 69 eggs kept as controls none hatched. Moreover, eggs that did not hatch after exposure to these emanations were more susceptible to other stimuli than normal eggs, as a higher percentage of them hatched when they were subsequently slightly shaken. When the quartz plate was replaced by glass the cultures also had a slight stimulating effect on the hatching of eggs, but to a much less degree than when quartz was used.

E. Hindle.

PHILIP (Cornelius B.). **Supplemental Note regarding Mosquito Vectors of Experimental Yellow Fever.**—*Science*. 1930. Dec. 5. Vol. 72. No. 1875. p. 578. [3 refs.]

Some time ago an authority on those insects identified mosquitoes that *rightly* should have been named *Aedes (Stegomyia) albopictus*, *wrongly* as *Aedes (Stegomyia) scutellaris*; consequently the specific name *Scutellaris* took precedence, the name *albopictus* lapsed from use, and for some time two distinct species of the subgenus *Stegomyia* were labelled under the same specific name "*scutellaris*." In time, the mistake was discovered, the species *albopictus* was recognized and its name lawfully restored to proper and correct use as that of a species different from *scutellaris*. But in the meantime confusion had occurred from the two different species having been called by the same name. The author draws attention to an instance of this unhappy confusion that might have occurred when two different parties, namely: (a) DINGER, SCHÜFFNER and others (*Nederl. Tijdschr. v. Geneesk.*, Dec. 1929, No. 51, p. 5982); and (b) DE VOGEL (see this *Bulletin*, Vol. 27, p. 486), were testing some species of *Stegomyia* with regard to their susceptibility to the infection of yellow fever. Both parties used the same species of *Stegomyia*, and both parties found it more or less susceptible: but one party called it quite rightly *Aedes (Stegomyia) albopictus*, and the other party, unaware of any impropriety, called it quite wrongly *Aedes (Stegomyia) scutellaris*.

The author does not say that any inconvenience *has* happened from this confusion, so far; but he may be pardoned for drawing attention to the iniquity of using bad names for insects, even when they are detected in bad leanings.

A. A.

PHILIP (Cornelius B.). **List of Mosquitoes collected in Nigeria, West Africa, Incidental to Research on Yellow Fever.**—*Proc. Entom. Soc. Washington*. 1931. Feb. Vol. 33. No. 2. pp. 44-47. [3 refs.]

From this list of West African mosquitoes we take the names of the following species there stated to be implicated in the transmission of the infection of yellow fever:—*Stegomyia aegypti*, *S. simpsoni*, *S. africana*, *S. luteocephala*, *S. vittata*, *Aedimorphus stokesi* (= *apiciargentea*), and *Mansonioides africanus*. [The first is the only proved natural vector]

A. A.

SHANNON (Raymond C.). **On the Classification of Brazilian Culicidae with Special Reference to those capable of harboring the Yellow Fever Virus.**—*Proc. Entom. Soc. Washington*. 1931. June. Vol. 33. No. 6. pp. 125-164. With 7 plates. [17 refs]. [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

Most of this is taxonomy, but taxonomy animated with ecological salt and harbingered by philosophical discourse. The items that engage our particular attention are the two following:—

1. Experiments in the Bahia laboratory during two years indicate that the Brazil mosquitoes capable of harbouring the yellow fever virus for terms longer than the usual incubation in "*stegomyia*" all belong to the genera *Psorophora*, *Aedes*, and *Mansonia*, all of which "feed primarily on mammalian blood." Possibly *Iaemagogus*, being akin to *Aedes*, may be susceptible. *Deinocerites* of the crab-holes attacks man freely, but being derived directly from *Culex*, is unlikely. *Culex quinquefasciatus* [= *fatigans*] has been discovered "to be at least a highly unfavourable host."

[These observations are in accord with those made in Nigeria, at Lagos, where successful transmission of yellow fever by biting was obtained "with a number of species of *Aedes* . . . and with *Mansonia africana*." There too *Eretmopodites chrysogaster* was proved to be "a favourable host", and *Culex thalassius* was infected, "after an adequate incubation period", by injection].

2. From a study of the American species the author is inclined to separate *Stethomyia* from *Anopheles* as a very distinct genus.

A. A.

KUMM (Henry W.). **Studies on *Aedes* Larvae in South-Western Nigeria and in the Vicinity of Kano.**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 65-74. With 8 text figs. [12 refs.]

Descriptive entomology. This paper deals with the *Aedes* larvae commonly found in Nigeria. It gives a key for the identification of the species, a comparison of their diagnostic characters, a list of the breeding-places—pots, rock-holes, rot-holes, crab-holes, bamboo-stumps, pools—where the different species have been found, and diagnosis of three species. It is well supplemented with figures in the text.

A. A.

CHOWDHURY (K. L.). **Some Observations on the Hibernation and 'Wintering' of Anophelines in the Punjab.**—*Records of the Malaria Survey of India*. 1931. Sept. Vol. 2. No. 3. pp. 407–421.

These observations of the wintering of certain Indian anophelines were made at Karnal [lat. about 29° N., long. about 76° 30' E.] in the Punjab and relate to *A. fuliginosus*, *culicifacies*, *subpictus*, *stephensi*, *listoni*, *hyrcanus* var. *nigerrimus*, *barbirostris*, *pallidus*, *pulcherrimus*, *maculipalpis* var. *indiensis*, *maculatus*, and *gigas*.

Of the first seven, *subpictus* alone seems to be a true hibernating species, probably as an adult; its larvae cannot be found in the winter; in the laboratory the adults die quickly with the coming of cold nights in December; its eggs, if laid on water, hatch when the temperature is below 50° F. (but the resulting larvae die young) and when kept on moist earth for a test of viability at the end of winter "have given negative results". *Fuliginosus*, *culicifacies*, *stephensi*, *listoni*, *hyrcanus*, and *barbirostris* have been found, both larvae and adults—the adults with fresh blood in them—throughout the winter; but their winter numbers are much reduced by death among adults on the approach of cool nights, and by retarded growth (and increased mortality) of larvae, since larval growth takes place in winter only if the daily maximum air-temperature rises above 70° F.; calculating from the length of their pre-adult and adult stages in winter, it would appear that the winter season must be bridged (ovum to ovum) in a single cycle. Of *pallidus*, *pulcherrimus*, and *maculipalpis* the author obtained in winter only active adults but not any larvae of *maculipalpis*. Six larvae of *A. gigas* were found in a well in February.

A. A.

CHRISTOPHERS (S. R.) & BARRAUD (P. J.). **The Eggs of Indian Anopheles, with Descriptions of the hitherto Undescribed Eggs of a Number of Species.**—*Records of the Malaria Survey of India*. 1931. Mar. Vol. 2. No. 1. pp. 161–192. With 33 figs. on 5 plates. [39 refs.]

By its nature, this paper cannot be summarized to any good purpose, although a word of appreciation of its merits cannot be withheld. It comprises (1) a statement of accounts of other writers on eggs of Indian species and a list of references to the publications of those authors, as well as to publications dealing with eggs of species of other countries. (2) an account of the authors' technique; a description of the *Anopheles* egg in particular detail; a tabulated logical classification of all known *Anopheles* eggs according to the authors' method of discrimination; a synoptic arrangement of the eggs (so far as they are known) of all Indian species, according to their distinctive markings; and a brief description of the egg of each such species, with a sufficient accompaniment of good clear figures.

A. A.

CHRISTOPHERS (S. R.). **Studies on the Anopheline Fauna of India. (Parts I-IV.)**—*Records of the Malaria Survey of India*. 1931. June. Vol. 2. No. 2. pp. 305–332. With 3 maps. [24 refs.] [Central Research Inst., Kasauli.]

Notes on anophelines of Kashmir, of N.W. India, and on varieties of *A. gigas*, *A. lindesayi*, and *A. maculatus*.

A. A.

STRICKLAND (C.) & CHOWDHURY (K. L.). **The Anopheline Larvae of the Countries from India and the Orient to the Antipodes. A Supplement (1931) to the Anopheline Larvae of India, Ceylon and Malaya.**—36 pp. With plates XIII–XXI. [31 refs.] 1931. Calcutta & Simla: Thacker, Spink & Co., Ltd. [Rs. 1/12.]

Some tables supplementary to the work reviewed in Vol. 24, p. 772 of this *Bulletin*.

A. A.

YANG (Ching-po). **Observations on the Incidence of Anopheles in a Rural Area outside Peiping and on the Conditions of Anopheles Breeding.**—*Nat. Med. Jl. China*. 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 513–520. With 1 chart in text & 5 figs. on 1 plate. [1 ref.] [Peiping Union Med. College, Peking.]

The land about Peiping is largely rice, other watery cultivation in ponds fed from streams, and fish-ponds in which are five local species of fishes. *Anopheles* gradually increase in numbers from the latter part of July to the latter end of August and then there may be a sudden large increase after heavy rainfall. *Anopheles* larvae are not found in ponds that are quite clear of vegetation and contain fish, but in ponds thickly covered with vegetation they are as abundant as elsewhere in spite of the presence of fish. Experimentally, the deep fish are just as destructive of larvae as the surface-feeders; and of aquatic vegetation *Ceratophyllum* seems more attractive to *Anopheles* than *Spirodela*. The conclusion is that clearance of floating vegetation and stocking with fish would be an improvement.

A. A.

FENG (Lan-chou). **The Larvae and Pupae of the North China Species of Anopheles; their Structure and Breeding Habits.**—*Nat. Med. Jl. China*. 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 493–512. With 31 figs. on 4 plates. [16 refs.] [Peiping Union Med. College, Peking.]

Description and parcel figures of 4th stage larvae, pupa, and breeding-habits, and notes on the hibernation of *Anopheles pattoni*, *A. lindesayi* var. *japonicus*, and *A. hyrcanus* var. *sinensis*. *A. pattoni* winters in the early larval stages, under ice, even under ice 18 inches thick, and the larvae derive much benefit from silk-weeds, which keep them submerged and supply them with oxygen. The other two species probably winter as adults.

A. A.

CHRISTOPHERS (S. R.) & PURI (I. M.). **Notes on Some Anopheline Mosquitoes collected in Sierra Leone including Differentiation of *Anopheles dthali* Patton (Mediterranean) as a Distinct Species from *Anopheles rhodesiensis* Theo. (Ethiopian).**—*Indian Jl. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1133–1166. With 3 text figs. & 3 plates. [5 pages of refs.] [Central Research Inst., Kasauli.]

A paper of critically descriptive entomology. *A. rhodesiensis* and *A. dthali* are compared and discussed, the geographical distribution of each is given in particular detail, and the adult of the former is described. New adult characters are noticed and the fullgrown larva is described for the

following species—*A. thelevi*, *A. smithii*, and *A. gambiae*. *A. freetownensis* is declared as a new species. A bibliography of 5 pages is given for 8 species and 2 varieties.

A. A.

LEESON (H. S.). **Anopheline Mosquitos in Southern Rhodesia 1926-1928. A Report on Investigations made during Researches on Black-water Fever conducted by Dr. G. R. Ross.**—No. 4 of the *Memoir Series of the London School of Hygiene & Tropical Medicine*. pp. ix+55. With 10 text figs. & 15 plates. 1931. Mar. London : School of Hygiene & Tropical Medicine. [8s.]

As recorded in this excellent report, 14 species of Anophelini and 50 species of Culicini were collected in S. Rhodesia. Of the 4,417 adult anophelines collected in the course of at least a year, about 46 per cent. were *A. funestus*, about 19 per cent. *A. gambiae*—these two species being the only two found carrying infection with *Plasmodium*—about 16 per cent. *A. pretoriensis*, about 12 per cent. *A. rufipes*, and about 4 per cent. *A. squamosus*, all the other nine species together amounting to only about 3 per cent. Keys for discriminating the adult males and females and the fourth-stage larvae of these Anophelines are given; the natural habitats and the hut and house haunts of the adults and the breeding-places where their larvae were found are described. These details are particularly full in the case of the first four species which are the commonest in the Shamoia district and include the only two known local carriers of malaria. The report includes recommendations for improving the human environment, treatment of breeding-places, and protection against adult anophelines, and it is bountifully illustrated with views of breeding-places and indoor and outdoor haunts of the adult insects.

A. A.

LEESON (H. S.). **The Dry Season Habits of Two Species of Anopheles in Southern Rhodesia.**—*Proc. Entom. Soc. London*. 1930. Dec. 31. Vol. 5. Pt. 2. p. 26.

The hibernation and the seasonal prevalence of *Anopheles funestus* and *A. gambiae* in highlands (3,600 ft.) of S. Rhodesia are here contrasted. Adults of both species first appear there about the beginning of the wet season (December or January). The numbers of *A. funestus* increase during the wet season, reach their maximum in February, and then gradually diminish, month by month, until by December none are to be found. The numbers of *A. gambiae* also increase during the wet season to a maximum in March, but then drop rapidly to 0 in June. During the ensuing dry season females of *A. funestus* full of eggs, could be found hiding under rocks in the dry (though still damp) beds of rivers. In August these females leave their retreat and after laying their eggs near marshy and riverside ground, die; by December no adults can be found, but young larvae are plentiful in the breeding-places, and in January the new generation of adults comes forth. In contrast *A. gambiae* disappears from the highlands altogether both adults and larvae in the dry (winter) season; its

larvae however could then be found at 1,500 ft., and down to 1,300 ft. its larvae, pupae, and adults were abundant. It merely shifts to warmer quarters and nurseries during the winter (dry) season.

A. A.

DE MEILLON (Botha). **Notes on the Larvae of Some South African Anophelines.**—*Bull. Entom. Res.* 1931. June. Vol. 22. Pt. 2. pp. 237-243. With 7 text figs. [9 refs.] [S. African Inst. for Med. Research, Johannesburg.]

The larvae of S. African anophelines are here grouped in 2 major and 4 subaltern sections according to the method of PURI. The larvae of *A. natalensis* and *A. ardensis* are compared. Some characters of the larvae of *A. squamosus* and of *A. theileri* are discussed.

A. A.

DAVIS (Nelson C.). **A Note on the Malaria-Carrying Anophelines in Belém, Pará, and in Natal, Rio Grande do Norte, Brazil.**—*Riv. di Malariologia.* 1931. Jan.-Feb. Vol. 10. No. 1. pp. 43-51. [7 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

Anopheles darlingi is now, for the first time, proved to be a carrier of malaria; of 200 specimens of this species caught in houses in Belém (Pará, Brazil) 22 per cent. were infected—the salivary glands in approximately 5 per cent. of 181 examinations of those organs. Filaria "embryos" were found in 14 specimens of *A. darlingi* (and embryos of *F. bancrofti* in the blood of 5 of 25 persons examined).

In Natal (Rio Grande do Norte, Brazil) 62.8 per cent. of 172 *A. gambiae* caught in houses were infected with malaria—the salivary glands in 30.2 per cent. of the 52 examined.

In these cities high infection-rates of *Anopheles* were definitely "associated with severe outbreaks of human malaria."

A. A.

SHROPSHIRE (J. B.). **Mosquito Fighters in Panama.**—*Milit. Surgeon.* 1931. June. Vol. 68. No. 6. pp. 769-776. With 3 text figs.

A chatty paper by a Field Sanitary Inspector of the Panama Canal-Zone Departments. (The F.S.I. is a subordinate officer of the Canal Medical Department; his "chief duty is the elimination of the anophelines", a duty that takes him "into far-away places, into the jungles . . . even into the mangrove swamps" of the sea-coast.) The civilian "mosquito-fighters" service consists of 60 men—5 foremen, 5 mosquito hunters, 1 skilled mason and a mate, 35 mechanics, and 13 labourers—distributed in 5 stations but reasonably mobile on occasion. The foremen and hunters have a practical knowledge of culicology, sufficient for their duty of searching for breeding-places and catching winged anophelines in barracks; they can also identify a house-fly maggot, since the Field-Inspector, who organizes their work, also lends a helping hand in other branches of sanitation and keeps an eye on the trespasses of prospective squatters. The routine working hours in the service are 7 a.m. to 3.30 p.m. "Nine-hundred-and-ninety-nine of adult anophelines caught in barracks are these"—*A. tarsimaculatus* and *A. albimanus*—"the Zone's principal malaria transmitters."

A. A.

CARDAMATIS (J. P.). Les espèces de moustiques en Grèce et tout particulièrement d'Athènes. [**Mosquitoes of Greece, and Particularly of Athens.**—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 122–131. With 4 text figs. [11 refs.]

The following species of Anopheles are included in the list : *A. algeriensis*, *bifurcatus*, *atheniensis* (n. sp.), *cardamatidis*, *elutus*, *maculipennis*, *macedoniensis*, *palestinensis* (Island of Paros), *pseudopictus*, *sinensis*, *superpictus*, *vagus*.

A. A.

HARVEY (D.) & SYMES (C. B.). **Oxygen Absorption of Natural Waters in Nairobi with Reference to Anopheline Mosquitos.**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 59–64.

The paper consists of tables and explanatory notes that cannot be further abridged. The authors' summary consists of "Suggestions" the most informative of which is that the waters that produced most Anopheline larvae were "those in which the O₂ values varied most during the period."

A. A.

RUSSELL (Paul F.). **Anopheles Mosquitoes and Avian Malaria.**—*Amer. J. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 145–146. [1 ref.]

The author records the fact from Manila—of some meaning for those who search wild Anopheles for evidence of malaria infection—that although *Culex fatigans* and *Aedes aegypti* will feed freely on canaries, Anopheles under the same experimental conditions will not. During a term of four months over 8,000 Anopheles of 12 Oriental species were caged with canaries, but they preferred starvation to feeding on them. They would however take canary blood mixed with saline and mango juice.

A. A.

ROUBAUD (E.). Recherches expérimentales sur les générations et les phases biologiques de l'*Anopheles maculipennis*. (**Experimental Research on Generations and Biological Phenomena in "*Anopheles maculipennis*."**)—*Riv. di Malariologia.* 1931. Jan.–Feb. Vol. 10. No. 1. pp. 1–42. With 12 text figs. & 6 figs. on 1 plate. [20 refs.] English summary p. 157. [Pasteur Inst., Paris.]

In his insectarium in Paris Roubaud has raised a series of three or four generations of *Anopheles maculipennis* in the course of a year. At length the reproductive activity of the females is suspended as a result not of winter cold as most people think, but of a state of fatigue called by him "asthenobiosis" and characterized by inactivity, hypertrophy of the Malpighian tubules, wasting of the ovaries, and accumulation of fat—what most people call winter torpor or hibernation (see this *Bulletin*, Vol. 21, p. 141). This paper is a further study of "asthenobiosis." From his present observations the author thinks that the existence of two varieties of this species averred by Dutch authors—one a harmless variety, remaining completely torpid throughout the winter, not feeding and not developing eggs but storing fat; the other a dangerous variety, not being completely torpid throughout winter and not storing fat, but occasionally sucking blood and capable of harbouring malarial infection—is not sufficiently established.

A. A.

- i. ROUBAUD (E.) & GASCHEN (H.). Sur l'adaptation zoophile de l'*Anopheles maculipennis*. (Rapports entre la différenciation maxillaire et la fécondité.) [**Maxillary Armature and Fecundity of *A. maculipennis*.**]—*Bull. Soc. Path. Exot.* 1931. Mar. 11. Vol. 24. No. 3. pp. 203-209. With 1 text fig. [1 ref.]
- ii. —. Nouvelle contribution à l'étude du zootropisme anophélien (*A. maculipennis*).—*Ibid.* pp. 229-246. With 7 text figs. [3 refs.]

i. A comparison, with numerical statements and illustrative text-figure of maxillae, of the *fertility* of two different lots of *Anopheles maculipennis* ♀♀—the one lot coming from places in Morocco and having maxillae not differentiated in a zoophilian sense, the other lot from the west of France and having maxillae differentiated for zoophily. The authors state that the results confirm an important fact, to wit that "the mean fertility of the females increases as their maxillary armature is differentiated in favour of zoophily"—i.e., maxillae stronger and with serrations more than 14.

ii. This is a polished restatement of the author's well-known theory of a zoophile race of *Anopheles maculipennis*. It is well and clearly set forth.

A. A.

TRENSZ (F.). L'index maxillaire d'*Anopheles maculipennis* et la théorie du zootropisme anophélien. [**The Maxillary Index of *Anopheles maculipennis* and the Theory of Anopheline Zootropism.**]—*Arch. Inst. Pasteur d'Algérie*. 1930. Mar. Vol. 8. No. 1. pp. 1-70. With 45 graphs & 2 plates. [75 refs.] [Pasteur Inst. of Algeria, Algiers.]

ROUBAUD's theory of zoophily and zootropism in *Anopheles maculipennis* was noticed in this *Bulletin* (Vol. 19, pp. 476-478) nearly nine years ago, as was also his earliest defence and expansion of it against LANGERON's and other French colleagues' criticism (*ibid.* pp. 478-479). Often since then has this theory received direct or incidental notice here, the latest instance being a criticism by Trenszt (this *Bulletin*, Vol. 27, p. 911) who states that he cannot discover a single fact in its favour.

In the present paper of 70 pages Trenszt now records in much detail the observations on which this shattering conclusion is based. The observations of the maxillary index (i.e. the number of serrations in the female maxilla) were made in homesteads, farms, villages, communes, etc., in Algeria, Italy, and France. In each such place the local *Anopheles* were studied (a) in themselves with regard to their maxillary index, their frequency and their condition (whether gorged or not), in the houses and in the outhouses for domestic animals, and their breeding places; and (b) in their environment, with regard to its reputation for malaria, and its human and domestic-animal population. Thus, in each place and each region of this wide survey the maxillary index could be determined in circumstances both favourable and unfavourable to its modification in the direction of "zoophily."

In Algeria 861 *Anopheles* from *gourbis* very unfavourable for zoophily and 422 from farms favourable for zoophily were examined. They had the same maxillary index, 14-15, 14 predominating. Here we must infer a zoophile and "protective" *Anopheles* fauna in a notoriously malarious country.

In Italy (provinces of Bologna, Ferrara, and Ravenna) 2,028 *Anopheles* from 22 farms were examined. Those from houses, pigstyes, cattlesheds, and stables had the same maxillary index—the graphs showed no differentiation of local types of dentition. The gorged females had the same index as those not gorged. No correlation was observed between the degree of increase of the maxillary index, the proportion of gorged insects, the abundance of cattle, or the malarious nature of the localities visited.

In France 727 *Anopheles* from 3 farms very favourable for the differentiation of distinct types of dentition had a maxillary index 16–17. Such an index would suggest an imperfect adaptation to cattle and would therefore point to circumstances favourable to malaria; but malaria disappeared from two of these places fifty years ago, although the distribution of breeding-places [of *Anopheles*], and the numbers and the stalling conditions of cattle have not changed.

Finally, with regard to ROUBAUD's maxillary index, the author argues with much force that it is mathematically of no value, because of the fortuitous individual variations in the number of maxillary denticles. Instead of the mean of 25 examinations employed by ROUBAUD, examinations of the order of 10,000 would be required for calculating the mean. To illustrate the variation in the number of maxillary denticles the author gives the following instances: 1. In a series of 1,090 maxillae from the same village six had 13 denticles, fifty-three had 14, a hundred and forty-five had 15, two-hundred and eighty-six had 16, two-hundred and seventy-two had 17, a hundred and seventy-six had 18, a hundred and eighteen had 19, twenty-eight had 20, and six had 21. 2. In a batch of 400 *Anopheles* only 35 per cent. had the number of denticles equal in *both* maxillae; in 44 per cent. there was a difference of 1 tooth; in 16 per cent. a difference of 2 teeth; in 4 per cent. a difference of 3 teeth, and in 1 per cent. a difference of 4 teeth between the two maxillae. 3. A hundred *Anopheles* from the same place were taken by chance and divided into four lots of 25 each; the individuals of the four lots were measured, and the maxillary indices of the four lots were, severally, 14.1, 14.8, 15.1, 15.1.

A. A.

VAN THIEL (P. H.). Züchtungsversuche in Zusammenhang mit dem Rassenproblem bei *Anopheles maculipennis*. [**Breeding-Experiments in Connexion with the Race Question in *Anopheles maculipennis*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Apr. Vol. 35. No. 4. pp. 208–227. With 2 text figs. [22 refs.] [Inst. for Trop. Med., Leiden.]

An interesting biological study—rather detached from the medical purview—on the influence of the colour of the vessel in which larvae (of *Anopheles maculipennis*) are raised, upon the colour and size of the adults. It is a critically experimental review of the work of ACHUNDOW (see this *Bulletin*, Vol. 26, particularly p. 250, also reference in p. 814). The present author confirms ACHUNDOW in respect of the influence of the colour of the larval breeding-vessel upon the colour of the adult *Anopheles maculipennis*. But the influence of the colour upon the size of the adult was confirmed only when all the larvae excepting one were removed from the breeding-vessel—and here of course other environmental influences vitiate any conclusion from one particular influence. Only exceptionally, says the author, can the colour of the bottom of a larval breeding-ground influence the colour and size of the adult: for instance, only the existence of genetic differences can explain satisfactorily the difference in colour and size between typical *A. maculipennis* and the race or variety *A. m. atratus*.

A. A.

BRUCK (R.). Zur Frage über die Ernährung der Larven von *Anopheles maculipennis*. [On Larval Nutrition in *Anopheles maculipennis*.]—*Travaux Soc. Naturalistes de Léningrad*. 1930. Vol. 60. No. 1. pp. 15–27. [9 refs.] [In Russian. German summary pp. 27–28.] [Natural Science Inst., Peterhof.]

According to the German summary this work facilitates the laboratory treatment of the larvae of this species by describing the mechanical passage of the food through the gut. The time taken from the act of swallowing to the act of defaecation is from 40 to 60 minutes.

A. A.

PRUTHI (Hem Singh). Preliminary Observations on the Influence of Different Concentrations of Hydrogen Ions and Temperatures of Water on Mosquito Larvae (*Anopheles subpictus*).—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 131–135. [1 ref.]

The author speaks without hesitation of the vital influence of the pH concentration on aquatic life. In the case of *Anopheles subpictus* he found that its larvae appeared to flourish equally well in all pH concentrations between 5.2 and 9.8, but that the number transforming to pupae that hatched adults was greatest at pH 7.4. (Using 15 larvae for each experiment: at pH 3.5, all died in the course of three days; at pH 5.2, nine pupated and two hatched adults; at pH 7.4, nine pupated and all hatched adults; at pH 8.5, five pupated and four hatched adults; at pH 9, one pupated and hatched; at pH 9.8 all died without pupating).

With regard to the influence of temperature upon larvae (*A. subpictus*) the author found that although they could live at 32°–34° C. they very seldom pupated (3 out of 45) and still more seldom finished as adults (1 out of 45) at those temperatures; whereas at 28°–30° C. 22 out of 45 pupated and 19 finished as adults.

A. A.

PINTO (Genserico de Souza). Sobre a presença de *Anopheles costalis* no Brasil. [*Anopheles costalis* in Brazil.]—*Folha Med.* 1931. Oct. 5. Vol. 12. No. 28. pp. 330–332. [3 refs.]

In March 1930 Dr. SHANNON reported his finding of *A. costalis* in Natal, Rio Grande do Norte, shortly before a severe outbreak of malaria (see this *Bulletin*, Vol. 27, p. 912). The identification was confirmed by Dr. N. C. DAVIS. The author in the present article describes the characters of *A. costalis* on which the mosquito in question was identified. In houses of that quarter of the town which suffered most from malaria 172 mosquitoes were caught; on dissection 108 (62.8 per cent.) were found infected, and 52 (30.2 per cent.) had sporozoites in their salivary glands.

At São Bento do Norte, 182 kilometres from the capital, Dr. ROUANET of the Rockefeller Foundation verified the presence of *A. costalis*. The number of persons infected was very large; in Taipú and Ceará-Mirim some 4,000 daily; the Alecrim quarter of the capital with 12,000 inhabitants "was completely decimated", and of the Natal frontier population along the banks of the Potengy nearly all suffered.

The author considers three possible ways in which *A. costalis* may

have been introduced: (1) by aeroplanes which made Natal their first landing place in Brazil after crossing the Atlantic; (2) as larvae on the quick packets which cross weekly from Dakar to Natal, or (3) as adults on these boats. By exclusion he decides that the third is the most probable. He speaks of the invasion of South America by *A. costalis* as an exceptional if not a unique phenomenon, but notes that the epidemic of Mauritius and Réunion in 1866 were due to the recent introduction of the same species, quoting Ross in support.

H. H. S.

MER (G.). **Notes on the Bionomics of *Anopheles elutus*, Edw. (Dipt., Culic.)**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 137-145. With 2 text figs. [12 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

The seasonal variations in the size and form of the floats of the eggs are described and figured. Hibernation is not complete; the females feed and grow fat, and although a slow development of the ovary goes on it never progresses beyond the 2nd stage.

A. A.

DE MEILLON (Botha). **A New South African Anopheline.**—*Jl. Med. Assoc. South Africa.* 1931. Aug. 8. Vol. 5. No. 15. pp. 482-483. [S. African Inst. for Med. Research, Johannesburg.]

This new species from the Northern Transvaal and Natal is described as being not unlike *Anopheles gambiae* in appearance, except that the legs are not speckled and the tips of the female palpi are dark. The larvae were found in pools in beds of streams, along with *A. pretoriensis* and *A. gambiae*.

A. A.

i. SHORTT (H. E.). **Note on the Feeding Habits of *Phlebotomus minutus*.**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 1047-1049. [2 refs.]

ii. NAPIER (L. Everard). **Feeding Habits of Sandflies of the *Minutus* Group.**—*Ibid.* Apr. Vol. 18. No. 4. pp. 1377-1381. [7 refs.]

i. The author refers to a statement in a paper by LLOYD and NAPIER [this *Bulletin*, Vol. 28, p. 514] that *Phlebotomus minutus* feeds on the blood of cattle and man—a statement entirely contradictory to that of HOWLETT, who affirmed that reptile (gecko) blood is its normal nourishment, and completely opposed to his own experience of *P. minutus* as an insect that cannot be got to feed on man. The author propounds an alternative verdict—either wrong identification of fly, or, unreliable technique employed in precipitation tests.

ii. Napier here states (1) that he was from the first quite aware that *P. minutus* had been supposed to feed only on lizard blood and that he therefore took good care to get expert confirmation that the species he and LLOYD were dealing with was of the *minutus* group; and (2) that he is quite convinced both of the trustworthiness of the precipitin test employed and of the accuracy of LLOYD's technique. SHORTT himself also (p. 1385) writes that he has "every confidence" and reliance in the methods employed by his old friend LLOYD.

A. A.

NITZULESCU (Virgil). Essai de classification des phlébotomes. [Classification of *Phlebotomus*.]—*Ann. Parasit. Humaine et Comparée*. 1931. May 1. Vol. 9. No. 3. pp. 271–275. [Parasit. Lab., Faculty of Med., Paris.]

After a criticism of the classification proposed by FRANÇA and PARROT and that proposed by SINTON, the author subdivides the genus *Phlebotomus* into the following five subgenera :

(1) Subgenus *Sintonius*, with buccal armature and crenulate spermathecae ; type *P. hospitii*. (2) Subgenus *Brumptius*, with buccal armature and non-crenulate spermathecae ; type *P. minutus*. (3) Subgenus *Larrousius*, without buccal armature, with spermathecae crenulated and more or less long in neck ; pharynx as in the type *P. major*. (4) Subgenus *Phlebotomus* without buccal armature, with spermathecae crenulated and short in neck ; type *P. papatasii*. (5) Subgenus *Adlerius* without buccal armature and with smooth spermathecae ; type *P. chinensis*.

A. A.

WOOD (R. C.). **Tsetse Fly Report, 1930.**—*Nyasaland Protectorate Ann. Med. Rep. on Health & Sanitary Condition for the Year ending 31st Dec., 1930*. Appendix IV. pp. 47–50.

This report relates entirely to the southerly and south-easterly spread of *Glossina morsitans* in Nyasaland, which is said to be still very serious and to demand close and constant watch in all districts. Speaking generally, the position at the end of 1930 did not show any appreciable difference from that of the previous year, although the widespread southerly migration in the Fort Manning and the minor wave in the Dowa district seem to have spent themselves. The barrier formed by clearing, native settlement, and cultivation in the Likuni valley has shown marked improvement and furnishes hopes. The author is convinced that there is "no connexion whatever between the movements of game and fly as they normally take place", and he is constantly puzzled by the mysterious and inexplicable movements of the fly. In one place he periodically observes swarms of fly on the trail of large herds of elephants to a certain point and there leaving them entirely. He finds places in fly-country heavily infested one year and almost free the following year, and vice versa, without any difference in the numbers of big game. In one district he sees hundreds of natives bringing baskets of tobacco to market from villages in fly-country, and laden motor-lorries plying along a road suitably wooded for fly, and yet no fly is to be seen in the market-place, or on the lorries when they are stopped for examination ; while in another district the fly is in the market-place and in the country roundabout for a few miles, yet a mile or so farther along the road it has disappeared. He thinks that the fly must have periodic migratory impulses on a large scale, and cannot possibly be guided by sight alone.

A. A.

FULLER (Claude) & MOSSOP (M. C.). **Entomological Notes on *Glossina pallidipes*.**—*Union of S. Africa. Dept. Agric. Science Bull. No. 67*. 1929. 27 pp. With 1 fig. [11 refs.]

This paper is based on eight weeks' observation of *Glossina pallidipes* in summer of 1927–28, on the banks of the white Mfolozi (Zululand),

where it was then very numerous. The authors addressed themselves to study the way the fly attacks the living victim, its behaviour towards inanimate objects and its reactions to heated objects, and its powers of smelling and seeing; they also studied the mechanisms of its sucking, and the effect of arsenic upon the insect.

In attacking a quadruped the fly always makes for the navel or its neighbourhood; if dislodged it commonly makes for the legs, or, if frequently dislodged, it may at last drop to the ground and wait; some desist and disappear (though the insect is as pertinacious as a housefly); but if it gets hold and becomes sated it settles in the grass, or in neighbouring bushes, or in more distant covert and flying close to the ground. Whether the creature is guided chiefly by scent, or by sight, or other stimulus is presently considered.

With regard to artificial decoys "dummies", etc. (see HARRIS in this *Bulletin*, Vol. 28, pp. 524, 525) the authors hold the opinion that such things are disregarded by the flies unless associated with movement and scent, and they think that Mr. R. H. HARRIS's observations of this matter are injured by his not having allowed for the presence of observers, or perhaps of some unnoticed wild animal, near his contraptions; in their own experience, here recorded in full particular, the horizontal "log dummy" and the artificial bushbuck did not prove specially attractive to *G. pallidipes*. Only once was a fly found on the horizontal log, and then when a motor-car had stopped within a yard of it. The artificial buck was set in a thicket in the morning, and when watched for 45 minutes in the afternoon it attracted only two flies. When replaced by a live cow and set up again at about 20 feet distance it was observed, in the course of 90 minutes' watch, to be "inspected" by 18 flies, while 80 flies were caught on the cow which was attacked at the rate of about one a minute. [HARRIS (*l.c.*) insists that a dummy shall be placed not among foliage but where it casts a sharp shadow].

With respect to the reaction to light and the powers of sight: in the authors' observation *G. pallidipes* is phototropic but "exhibits phases of negative phototropism", as when replete or gravid. Although cleaving to shade it can cross wide open tracts, but the authors think it incredible that in this adventure it can be guided by sight. The creature can find its way in the forest, and was attracted at night to a lighted room occupied by them, and could settle upon the black spots of the legs of their white cow; but from their own observation they conclude that its powers of sight are not much better than those of the housefly and, "that such recognition of form as it may possess is doubtful and at best limited to distances which are to the vertebrate eye extraordinarily short."

On the other hand they conclude that *G. pallidipes* has an acutely discriminative sense of smell. This they suspected when they observed the insect probing inanimate matter—a table, a black cloth, a hessian tent, etc.—having an animal taint, and tested in a series of experiments culminating in one where a cow was housed out of sight in a closed hessian tent set up in a clearing in a thicket. Before the cow was confined the tent was left for two days, to get free of any taint of man. Immediately the cow was impounded the fly began to arrive, showing a strong tendency to creep in from below. From their many observations of this variety the authors feel fairly sure that the insect when hunting flies low, to pick up and follow its quarry as a dog does by scent, that when in the chase it meets a strange object

it tests it by scent (probing with its proboscis), and that in this procedure its "vision is in effect non-operative." [Zoologists in general will find it hard to agree that eyes of such large proportions as those possessed equally by both sexes of *Glossina*, are Nature's enactment for an environment where eyes would be "inoperative" in the decisive business of finding food. But, after all, the question whether the fly is or is not attracted to an experimental trap of a certain visible kind in a certain light is one that is better decided by a jury of experimenters than by dialectics; and also it must be remembered that JACK [below] speaks as witness of a "decidedly impressive" demonstration of the efficacy of the HARRIS decoy trap for *G. pallidipes*.]

In finally reported experiments with arsenic the authors found that *G. pallidipes* would feed upon a cow wet with a weak solution (0.1 per cent.) of sodium arsenite without any ill effect; and that when allowed to rest upon and probe through cotton-wool saturated with any strong solutions of this salt, fatal effects followed only with solutions that would also be fatal to any dipped cattle that licked them.

A. A.

SOUTHERN RHODESIA. REPORT OF THE SECRETARY, DEPARTMENT OF AGRICULTURE FOR YEAR 1930. pp. 66-72. [Report on **Tsetse Fly Investigations by the Chief Entomologist** (JACK, Rupert W.).]

In respect of matters of general interest this report adds little to what has been noticed already in this *Bulletin* (Vol. 28, pp. 522, 523). The tendency of the fly (*G. morsitans*) to recover its former extensive limits is noted and the attempts to check its progress are described and criticized: and the slow but sure effect of hunting game in the confines of fly-infested country, the maintenance of game-free zones, and the control of wheeled traffic from fly-stricken areas are here, as there, appraised. With regard to the HARRIS fly-trap for *G. pallidipes* (see this *Bulletin*, Vol. 28, pp. 524, 525) the author notices that *G. morsitans* also has an inclination for shaded enclosures, being attracted even to empty boxes lying on their side, and he mentions his visit to Zululand and the "impressive" demonstration there of the value of the trap, by Mr. R. H. HARRIS.

To change the subject: the riddance from ticks (*Ornithodoros moubata*) of badly infested pigsties was effected only by burning piles of wood against both sides of the walls, which were 9 inches thick.

A. A.

NASH (T. A. M.). **The Relationship between *Glossina morsitans* and the Evaporation Rate.**—*Bull. Entom. Res.* 1931. Sept. Vol. 22. Pt. 3. pp. 383-384. With 1 text fig.

It is shown by a graphic record running for 18 months that a direct relation exists between the mean monthly-evaporation rate and the mean monthly fly-density. When the evaporation curve runs high the density of the fly decreases, and conversely.

A. A.

JACKSON (C. H. N.). **An Experiment on the Feeding Habits of *Glossina swynnertoni* (Dipt.).**—*Bull. Entom. Res.* 1931. June. Vol. 22. Pt. 2. pp. 175–181.

These interesting experimental observations—made in July and August—on the feeding habits of *Glossina swynnertoni* were based on the author's earlier observations which showed that the number of "hungrier flies" marked in woodland (*Berlinia-Brachystegia*) and recaptured in "female centres" (their supposed feed-grounds) during the first three days after being marked bore a higher proportion to the number recaptured afterwards than did the corresponding numbers for "originally repleter flies". The chosen area of observation and its botanical and large faunal characters, and the technique of experiment are described, and the statistics of the flies marked (1,028 male and 110 female) and recaptured (533) once or several times ($102 > 6$) are given in particular detail. The conclusions are, for the place and the season, that "hungrier flies" precede "repleter flies" in the flight from the woodland to the open glade that may be regarded as the feeding-ground; that flies visit the feeding-ground about once every fifth day; and that study of the record of flies several times recaptured suggests that flies "complete their hunger cycle" in about 5 days.

A. A.

HOARE (Cecil A.). **The Peritrophic Membrane of *Glossina* and its Bearing upon the Life-Cycle of *Trypanosoma grayi*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 57–64. With 2 text figs. [9 refs.]

In the investigation of the life-cycle of *Trypanosoma grayi* of the crocodile in *Glossina palpalis* the author has studied the relation of the peritrophic membrane to the distribution, in the intestine of the fly, of the developmental forms of the trypanosome.

The mode of origin, structure, and function of the peritrophic membrane in *Glossina* were first elucidated by WIGGLESWORTH (see this *Bulletin*, Vol. 27, p. 315). All that need be noticed here is that it is a fragile chitinous structure running throughout the entire length of the alimentary canal, its lumen being continuous with that of the oesophagus while its posterior end opens into the bulbular rectum; so that the food of the fly is never in contact with the intestinal epithelium, the peritrophic membrane acting as a dialyser in the process of digestion. (The author's evidence is that the membrane in question, although fragile and liable to rupture, is actually continuous throughout the alimentary canal; according to WIGGLESWORTH, it is constantly continuous only to the anterior part of the midgut, and is at best only fragmentary in the hindgut).

In the development of *T. grayi* within the peritrophic membrane the ingested trypanosomes multiply in the region of the midgut, then migrate to the region of the hindgut where ultimately they develop into the infective forms. But first, they have to escape from the open end of the peritrophic membrane into the lumen of the hindgut; there they become attached to the gut-wall, multiply and swarm some of them *forwards* and into the midgut, and some of them *backwards* (on

completing their final stage of infective development) to be discharged *per anum*, and some remaining for a time in the "ileum" (or anterior part of the hindgut) to complete their development and then to be discharged also. It is thus seen that the localization of *T. grayi* in the course of its development in the tsetse-fly is determined by the presence of the peritrophic membrane.

The histology of the hindgut of the tsetse has been described by STUHLMANN, but in view of its importance as the site of development of *T. grayi* and in its bearing upon the peritrophic membrane the present author describes some detail of its structure. Three regions are to be distinguished—an anterior piriform "ileum", a tubular "colon", and a bulbar rectum with its tubular extension to the anus.

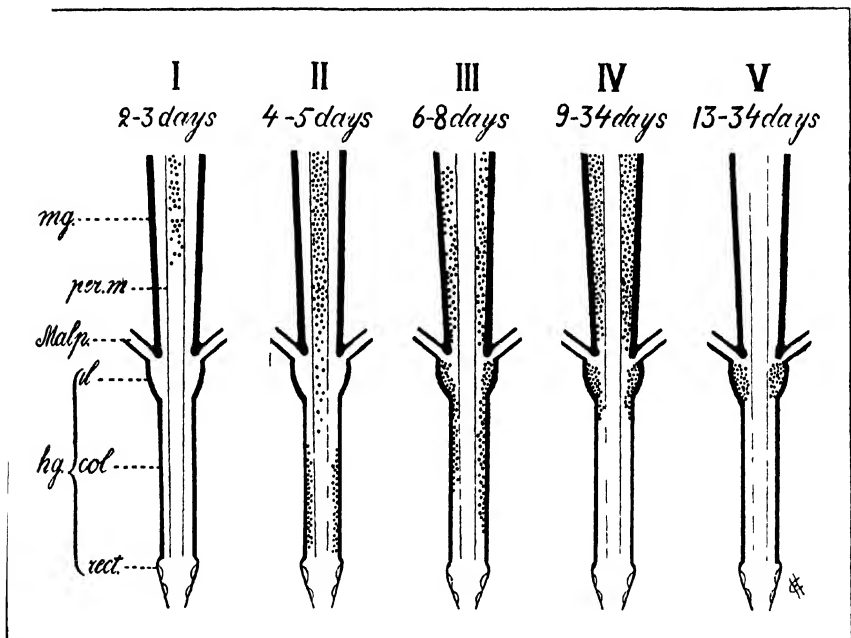


Fig. 1.—Diagram showing the distribution of *Trypanosoma grayi* in the intestine of *Glossina palpalis* in chronological order of its development: from 2 to 34 days after infection of the fly. (The flagellates are indicated by dots.)

mg. = mid-gut; hg. = hind-gut, with il. = ileum, col. = colon, rect. = rectum; per.m. = peritrophic membrane; Malp. = Malpighian tubes.

[Reproduced by permission from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*.]

There is a distinct sphincter-like valve at the junction of midgut and ileum. Each epithelial cell of colon and rectum carries a retrorse spinule. There is in the posterior moiety of the colon (and seen best when the gut is not distended) a second (prorectal) valve with retrorse-spinulose epithelium.

This interesting paper is concluded by a list of references to the structure and function of the peritrophic membrane in *Glossina*, in *Drosophilid* flies, and in *Cladocera*.

A. A.

WIGGLESWORTH (V. B.). **Digestion in *Chrysops silacea* Aust. (Diptera, Tabanidae).**—*Parasitology*. 1931. Jan. Vol. 23. No. 1. pp. 73–76. [15 refs.] [School of Hyg. & Trop. Med., London.]

Chrysops silacea is an intermediary host of *Loa loa*. The visceral anatomy and the histological changes in the gut during digestion are much as described in *Tabanus* (Cragg, *Ind. J. Med. Res.*, 1920). The oesophagus is slightly invaginated in the dilated fore end of the midgut and, as described in *Glossina* by LESTER and LLOYD [this *Bulletin*, Vol. 26, p. 263] there is a valve or sphincter at the after end of the midgut. Digestive enzymes, which are confined to the after half of the midgut, include an active invertase, a weak amylase, and an active tryptase and peptidase. The crop is not a reservoir for blood; in the fresh-emerged fly it is distended with air which doubtless keeps the body inflated until the body-wall becomes stiff. Coagulins and anticoagulins were not sought—probably, as described in *Tabanus*, the saliva is anticoagulant.

A. A.

KADLEZ (N.) & KUBAREV (M.). **On the Question of *Gastrophilomiasis*. (5 Cases of Creeping Disease).**—*Rev. Microbiol. Epidémiol. et Parasit.* 1930. Vol. 9. No. 3. pp. 407–424. With 9 text figs. [34 refs.] [In Russian. English summary.]

The authors describe five cases of creeping eruption observed in Samara (Russia), due to the larvae of *Gastrophilus (intestinalis or nasalis?)*. In all the cases the eruption was localized in the exposed parts of the skin, chiefly of the face; the burrows were directed downwards; in every case there was only a single simple burrow. The larvae progressed at the average rate of 1·7 to 7 cm. per diem.; they were extracted from the ends of the burrows with the help of a syringe needle, and the site was treated with iodine. This was followed by rapid healing of the lesions, leaving no traces of the eruption. A general description of *Gastrophilus* and other myiasis-producing flies is given, together with a historical survey of the incidence of creeping eruption.

C. A. Hoare.

SCHWARZ (A.). Beitrag zur Ätiologie der Creeping Disease. [**A Contribution to the Aetiology of Creeping Disease.**]—*Dermat. Woch.* 1931. Apr. 25. Vol. 92. No. 17. pp. 620–625. With 3 text figs. [20 refs.]

A case of creeping disease due to a larva of the bot-fly (*Gastrophilus equi*) in an infant had been allowed to lie out in the field in warm weather in the neighbourhood of Lemberg. The account is well illustrated to show the meandering track of the larva and (in section) the anatomical detail of the burrow and the larva. In a longish introduction other parasites that cause creeping eruptions of the skin are told of—Hypoderma and several species of Nematode worms.

A. A.

COULON (G.) & DINULESCU (G.). Un cas de myiase oculaire à *Oestrus ovis* L. en Corse. [**Ocular Myiasis due to *Oestrus ovis* L., in Corsica.**]—*Ann. Parasit. Humaine et Comparée*. 1931. Mar. 1. Vol. 9. No. 2. pp. 140–143. With 7 text figs. [Anti-Malaria Dispensary, Ajaccio, & Parasit. Lab., Faculty of Med., Paris.]

The patient in this case had no particular history, but he had nothing to do with sheep or stock. He arose from his bed with tingling eyes, and

5 hours afterwards went to hospital complaining of sharp pain in those organs, which now were inflamed and watery. About 15 first stage larvae of *Oestrus ovis* were discovered in each conjunctival sac. Excellent figures are given of this stage.

A. A.

MURDOCH (F. F.) & SMART (T. L.). **A Method of producing Sterile Blowfly Larvae for Surgical Use.**—*U.S. Nav. Med. Bull.* 1931. July. Vol. 29. No. 3. pp. 406–417. With 10 figs. (9 on plates). [2 refs.] [U.S. Naval Med. School, Washington.]

This paper describes the rearing of blowfly maggots for use in a treatment of chronic osteomyelitis devised by W. S. BAER of Baltimore. It gives, of course, the elementary facts of metamorphosis and life-history of the blowfly and a warning against blowfly-like maggots, such as *Cochliomyia macellaria*, that feed on living tissue; but for the most part it is a very particular description—which cannot be abridged—of the elaborate apparatus and ritual of a rigid sterilizing ménage.

[The interested reader should refer to papers on raising sterilized blowflies *ab ovo* by WOOLMAN (see this *Bulletin*, Vol. 18, p. 200; Vol. 19, p. 117; Vol. 20, p. 463, and Vol. 25, p. 825); and on experimental breeding of blowflies by COUSIN (*Id.*, Vol. 23, p. 871 and Vol. 24, p. 432).]

A. A.

KING (H. H.), GEORGE (P. V.), MANKIKAR (D. S.) & JESUDASAN (F.). **A Rat-Flea Survey of the Madras Presidency.**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 727–783.

Seven more reports of the rat-flea survey of the Madras Presidency first noticed in this *Bulletin* Vol. 27, p. 319. They are full of gazetteer detail on the position, status, population, housing and sanitation, meteorology, trade, etc., of the towns individually surveyed. The survey was in progress during 1929 and 1930.

A. A.

JOLLY (G. G.), FENN (V. W.) & DORAI (R.). **Rat-Flea Survey of Rangoon. Part I. The Port Area Period from 5th January, 1928 to 4th January, 1929.**—*Indian Jl. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1231–1244. With 1 map & 1 chart. [4 refs.]

In this 12 months' survey of the Rangoon Port Area, 7,293 rodents were examined and their 18,884 fleas. *Mus concolor* and *Nesocia bengalensis* in nearly equal proportions made up 62 per cent. and *Rattus rattus* only 8.83 per cent. of the total examined. The indoor rodents (*M. concolor*, *R. rattus* and *Mus musculus*) formed 53.63 per cent., the outdoor species (*N. bengalensis* and *R. norvegicus*) 42.57 per cent., and the indifferent *Cricetus caeruleus* 3.8 per cent. The average number of rats per 100 traps ranged from 36.10 in Feb. to 13.87 in Nov. For all species of rats the flea-index was 2.59, the *X. astia* index being 2.45 and the *X. cheopis* index 0.14. *X. cheopis* showed a preference for indoor rats. A pronounced seasonal fluctuation in the numbers of *X. astia* was demonstrated. Tables indicating a relation between the number of fleas per rat and the weight of the rat, and showing the sex distribution of rats and fleas by species are given.

A. A.

- SCHUURMAN (C. J.) & HUININK (A. M. Schuurman-Ten Bokkel). **A Study of the Epidemiology of Plague in West-Java, Specially with a View to a Possible Share of the Musk Shrew.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1930. Vol. 19. Pt. 3. pp. 431–546. With 2 maps, 4 plates, 2 graphs & 1 text fig. [59 refs.] [Plague Lab., Koeningan.]

This voluminous study, which centres on the “musk-rat” or “stink-mouse” *Crocidura caerulea*, casts some damaging reflexions on that unfragrant little shrew as a participator in the diffusion of plague. The study was made in the Cheribon Presidency of West Java, and lasted for 8 months. Besides this obscene shrew, the village rodents are *Rattus rattus grisiventer* (here called “the house-rat”), *R. r. concolor* (also numerous, and very susceptible to plague), *Rattus norvegicus* (scarce), and *Mus musculus*. The rat-fleas, also shared by the “stink-mouse”, are *Xenopsylla cheopis*, *X. astia* in small numbers, and *Pygiopsylla ahalae* sporadically.

The very suspicious facts observed about *Crocidura* in Cheribon are that, judging by trapping, it would seem to be more abundant than the house-rat; that it goes abroad at night, particularly along the main roads, and has been detected in villages other than those where it was first caught; that it nests about houses in proximity to house-rats, that the nests of the two are equally well infested with fleas of the same species, and that its flea-index is as high as—and often higher than—that of the house-rat. Furthermore, rat fleas may remain infectious on a “stink-mouse” for four days; so that even if the animal itself were insusceptible to infection it might still pass its infective fleas to a house-rat in another village. But as has been shown by others elsewhere, and is confirmed here, *Crocidura caerulea* though resistant is not immune to plague. In the present observations a number of shrews caught alive in plague time died of plague in their cages. In some of the cases of experimental infection (by inoculation, by food, and by infective fleas) some of the shrews died, and in others the virus remained active (in the spleen) for at least 17 days.

A. A.

- i. WASSILIEFF (A.). Les rongeurs et puces de la Tunisie et leur rôle dans la propagation de la peste. I. Note préliminaire sur les puces de la Tunisie. [**Rodents and Fleas of Tunisia and their Part in the Propagation of Plague.**]—*Arch. Inst. Pasteur de Tunis*. 1931. Apr. Vol. 20. No. 1. pp. 59–65. With 1 map in text. [Pasteur Inst., Tunis.]
- ii. COLAS-BELCOUR (J.). Notes sur la faune parasitologique des oasis de Tozeur et Kébili. [**Notes on the Parasitic Fauna of the Oases of Tozeur and Kébili (S. Tunisia).**]—*Ibid.* pp. 66–72. [17 refs.]
 - i. A meagre account of preliminary explorations in Southern Tunisia, in search of fleas and their rodent hosts, in the unfavourable winter season. A list of fleas caught is given; but very few rodents were at home when their burrows were visited.
 - ii. A cursory account of insects and ticks observed in these Tunisian oases at the same unfavourable season. A list of mosquitoes hitherto observed in the neighbouring oases of Jerid and Neftzaoua contains 3 anophelines—*A. hispaniola*, *A. sergenti*, and *A. multicolor*.

A.A.

STEPANOV (I.). Les rats et les souris de Batoum. [**The Rats and Mice of Batoum.**].—*Rev. Microbiol., Epidémiol., et Parasit.* 1931. Vol. 10. No. 1. pp. 83-92. With 2 text figs. [In Russian. French summary p. 92.] [Quarantine Lab., Batoum.]

The quarantine laboratory of Batoum in 3 years has examined 4,451 rats and 2,075 mice. The rats are *R. norvegicus*, 96·10 per cent.; *R. rattus*, 3·30; and *R. alexandrinus*, 0·60; they pullulate most in spring and autumn; 14,097 fleas were taken from them, 64·6 per cent. being female. The fleas are *Xenopsylla cheopis*, 20·5 per cent. (but in August and September more than 50 per cent.); *Ceratophyllus fasciatus*, 19·9 per cent.; *Leptopsylla musculi*, 64·3; cat and dog fleas, 1·3 per cent. The mice are all *M. musculus*; their fleas number but one-tenth of those of the rats; the species are *X. cheopis*, 6·5 per cent.; *C. fasciatus*, 9·8; *L. musculi*, 83·7. Neither rat nor mouse of those examined was infected with plague.

A. A.

Fox (Carroll). **A Limited Rat Flea Survey of Savannah, Ga.**—*Public Health Rep.* 1931. Mar. 13. Vol. 46. No. 11. pp. 574-575.

The survey was made in Savannah, Georgia, U.S.A. The rats were caught in cage-traps, and were taken to the laboratory in the (uncovered) traps, alive. Besides the fleas specified below there were found the rat-louse *Polyplax spinulosus*, and 4 species of rat-mites, *Laelaps echidninus*, *L. hawaiiensis*, *Liponyssus bacoti*, and *Hoplopleura acanthopus* (the last apparently accidental).

TABLE I. First part of survey, January 27 to March 31, 1927.

No. of rats : <i>R. norvegicus</i>	No. of fleas	Fleas per rat	<i>Xenopsylla cheopis</i>		<i>Ceratophyllus fasciatus</i>		<i>Leptopsylla musculi</i>		<i>Echidnophaga gallinacea</i>		<i>Ctenocephalides canis and felis</i>
			Total	No. per rat	Total	No. per rat	Total	No. per rat	Total	No. per rat	
387	1,764	4·6	891	2·3	361	0·9	460	1·2	52	0·13	5

TABLE II. Second part of survey, September and October, 1927.

500	4,097	8·2	3,599	7·2	22	0·04	355	0·71	117	0·23	4
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A. A.

CARRIÓN (A. L.). **Final Report on a Rat-Flea Survey of the City of San Juan, Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Mar. Vol. 6. No. 3. pp. 273-282. With 5 charts. [3 refs.] [Health Dept., Porto Rico.]

This survey was continued for three years. Live rats caught 1,005, *Mus norvegicus* 72 per cent., *M. rattus* 13 per cent., *M. alexandrinus* 15 per cent. Fleas captured 7,145 (on 57 per cent. of the rats=rat-flea

index 7.1) of which 98.5 per cent. were *Xenopsylla cheopis*. The rats were concentrated at the water front and in the residential area, and the flea-index was highest (14) in the dock-rats.

A. A.

ROUBAUD (E.). Invasion domiciliaire spontanée produite par la puce des rongeurs indigènes, *Ceratophyllus fasciatus* Bosc. [**Spontaneous House Invasion by Rat-Fleas** (*Ceratophyllus fasciatus* Bosc.).]—*Bull. Soc. Path. Exot.* 1931. May 13. Vol. 24. No. 5. pp. 383-384. [1 ref.]

Although BACOT thought that *Ceratophyllus fasciatus* was, probably, greatly to be feared in epidemics of plague, others have considered it to be a flea that keeps strictly to rat-holes and is therefore not likely to convey infection to man. Roubaud refers to a house in Groningen which KAPSENBERG found to be greatly infested with *C. fasciatus*, the infestation being concurrent with an abnormal mortality of rats, but the fleas most strangely disregarding man. He also mentions a case in his own experience where *C. fasciatus* was found all over a certain house, which was not known to be infested with rats and had not any rat-holes near it; as the fleas in this house had no antipathy to man, and showed a particular fondness for children, Roubaud shares BACOT's mistrust of the breed.

A. A.

SIKES (Enid K.). **Notes on breeding Fleas, with Reference to Humidity and Feeding.**—*Parasitology*. 1931. Apr. Vol. 23. No. 2. pp. 243-249. With 1 chart. [4 refs.] [School of Hyg. & Trop. Med., London.]

A competent physiological study on the larva of *Ceratophyllus wickhami*. The larvae require 15 to 28 per cent. of water in their food. At a constant temperature a relative humidity of 80 per cent. gave the best results among new-hatched larvae fed on different substances at varying humidities. They will eat a great variety of stuff, but dried blood is a convenient food in the laboratory.

A. A.

ROUBAUD (E.). Prédominance de *Synosternus pallidus* Taschenb. (*Xenopsylla pallida*) comme puce domestique, dans certaines régions pesteuses du Sénégal. [**Predominance of *Synosternus pallidus* Taschenb. (*Xenopsylla pallida*) as a Domestic Flea in Certain Plague Areas of Senegal.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 551-554. With 3 text figs. [3 refs.]

Attention is drawn to the striking prevalence of *Synosternus pallidus* (Taschenb.) = *Xenopsylla pallida* in certain parts of Senegal as the domiciliary flea there. The species is known to be common on various mammals in Egypt and the neighbouring Sudan, occurs in Tunis, and must have a wide distribution since it is known also in Brazil and in Russia. *Synosternus* has been separated from *Xenopsylla* because the metasternum is not subdivided by a horizontal suture.

A. A.

BUXTON (P. A.). **The Thermal Death-Point of *Rhodnius* (*Rhynchota*, *Heteroptera*) under Controlled Conditions of Humidity.**—Reprinted from *Jl. Experim. Biol.* 1931. July. Vol. 8. No. 3. pp. 275-278. With 1 text fig. [4 refs.] [School of Hyg. & Trop. Med., London.]

The author wishes to determine precisely the conditions of temperature and humidity that are fatal to an insect—whether evaporation

into dry air cools the creature so that it can survive higher temperature than it can in moist air; or kills it by undue abstraction of moisture; or whether humidity has little effect even at nearly fatal temperature. The insect used for experiment was the unfed larva of the Reduviid bug, *Rhodnius prolixus*, between 3 and 7 days old. Experiments showed that the temperature that is fatal to this tiny insect is not, or little, affected by atmospheric humidity; at all the humidities death took place within half-a-degree of 43° C. at an exposure of 1 hour, and within about half-a-degree of 40° C. on an exposure of 24 hours; at any one humidity the range of temperature between that fatal to all larvae in a batch and that fatal to none was about 1.5° C., but greater inconsistency occurred when the relative humidity was 0 per cent. At exposures for 5 minutes (relative humidity not stated) death occurred within half-a-degree of 47° C.

The author would like to get in touch with others who are interested in the effects of temperature on insects, under controlled conditions of humidity.

A. A.

DEL PONTE (Eduardo). Catálogo descriptivo de los géneros *Triatoma* Lap., *Rhodnius* Stal. y *Eratyrus* Stal. [**Descriptive Catalogue of the Genera *Triatoma* Lap., *Rhodnius* Stal. and *Eratyrus* Stal.**—*Rev. Inst. Bacteriológ.* Buenos Aires. 1930. Nov. Vol. 5. No. 8. pp. 855-937. With 13 coloured plates & 25 text figs. [2 pages of refs.]

The catalogue is on classical lines, giving besides a full description (or a diagnosis) the original reference, necessary synonymy, and geographical distribution of each species. There are numerous figures in the text, 13 fine coloured plates, and a bibliography.

A. A.

LIGGETT (Harold). **Parasitic Infestation of the Nose.**—*Jl. Amer. Med. Assoc.* 1931. May 9. Vol. 96. No. 19. pp. 1571-1572. With 1 text fig. [4 refs.] [Laryngol. Dept., Univ., & Med. College, Bellevue Hosp., New York.]

Whatever other parasites may have been there, the offending ones in this case were living larvae of the Dermestid carpet-beetle *Attagenus piceus* (identified by J. M. ALDRICH, curator of insects, Washington). The patient was a girl of 15 coming for treatment for much nasal discharge, hawking of pus, and persistent headache usually supraorbital, occasionally occipital; in the history 6 or 7 small white "worms" had once been discharged 3 or 4 months before and at intervals living dark brown insects with legs. She remained under examination, treatment and observation for more than 9 months. The history of treatment is mainly surgical. It necessitated the exploration of both maxillary antra and of the sphenoid sinus, and the removal of the right turbinate bone. The right antrum (only) was found full of polypi, necrosed tissue and pus. Neither eggs nor insects were found at the operations, but during the following 2 or 3 weeks of periodic irrigations of the affected cavities one or two living larvae of the carpet-beetle followed each ablution. Subsequently the nasal cavities and the sinuses were filled (by the displacement method of PROETZ) with nasal oil (COAKLEY formula). The reminder is added that the larval stage of the carpet-beetle lasts two years.

A. A.

PAWLOWSKY (E. N.) & STEIN (A. K.). Experimentelle Untersuchung ueber die Wirkung des Bisses der Walzenspinne *Galeodes araneoides* auf den Menschen. [**Experimental Test of the Effect of the Bite of the Spider *Galeodes araneoides* on Man.**].—*Ztschr. f. Parasitenk.* 1930. Dec. 17. Vol. 3. No. 1. pp. 8-16. With 3 text figs. [26 refs.] [Military Med. Acad. & State Inst. for Med. Science, Leningrad.]

Another confirmation of the fact that *Galeodes* notwithstanding its formidable appearance is not venomous or really hurtful to man.

A. A.

PINTO (Cesar) & DI PRIMIO (Raul). Contribuição para a biologia dos *Ixodidae* do Estado do Rio Grande do Sul (Brasil). [**Contribution to the Biology of Ixodidae in Rio Grande do Sul (Brazil).**].—*Rev. Med.-Cirurg. do Brasil.* 1931. July. Vol. 39. No. 7. pp. 236-239. With 1 graph in text & 3 figs. on 2 plates.

An investigation was begun in December 1930 to determine what ticks were parasitic for man and domestic animals in Rio Grande do Sul, what species transmitted or were suspected of transmitting disease, their intermediate hosts and their distribution. So far the authors have found three specimens of *Ixodinae*—*Boophilus microplus*, *Amblyomma ovale*, and *A. maculatum*—and one of the *Argasinae*, *Ornithodoros brasiliensis*. The first is particularly common in municipalities which are named. The two species of *Amblyomma* are found on the dogs in Cacimbinhas municipality. *Ornithodoros brasiliensis* is found in the loose soil round dwellings and in and about byres; it is the colour of the ground and when disturbed draws in its legs and is very difficult to distinguish from the fragments of earth. It is very resistant to cold and lives through the winter of São Francisco de Paula where the thermometer not infrequently registers -8°C . in June-August. Its bite produces in man a local itching with erythema and papule formation, together with, in some cases, rise of temperature, headache and dyspnoea. A further report on its pathogenicity is promised.

H. H. S.

MATHESON (Robert). **Note on the Tick *Ornithodoros talaje* (Guér.-Mén).**—*Parasitology.* 1931. Apr. Vol. 23. No. 2. p. 270.

A lady resident of Ransomville (New York) sends the author a "kind of bug" of which she states that, since she first noticed the kind three years before, she has found at least one specimen crawling on the wall in every room and in the hall of her house there. The bug turns out to be *Ornithodoros talaje* (confirmed by NUTTALL and WARBURTON).—[A species of rather enigmatic distribution, but having according to DUNN the habits of the bedbug, and, as the author says, normally occurring in warm climates]. The lady's family brought from Texas 16 years ago some bedroom furniture that had been stored there for a year.

A. A.

PHILIP (Cornelius B.). **Occurrence of a Colony of the Tick Parasite *Hunterellus hookeri* Howard in West Africa.**—*Public Health Rep.* 1931. Sept. 11. Vol. 46. No. 37. pp. 2168-2172. With 1 chart in text. [5 refs.]

Hunterellus is a minute Hymenopteron parasite of ticks, apparently of wide occurrence in America and also observed in Portuguese E. Africa and also, as now reported, at Lagos, where it was noticed only on

Rhipicephalus sanguineus. Of 321 replete nymphs of this species examined on 30th September, 231 showed exit-holes of the parasite, 60 still contained parasites, and 30 were shrunken and had no signs of a parasite.

A. A.

HIRST (Stanley). **On the Larval Trombidiid Mite (*Trombicula hirsti* L. Sambon) that causes the "Scrub Itch" of Northern Queensland and the Coorong, South Australia.**—*Trans. & Proc. Roy. Soc. South Australia*. 1929. Vol. 53. pp. 24–26. [2 refs.] [Zool. Dept., Univ., Adelaide, S. Australia.]

Trombicula hirsti described as larva of a new species of harvest-mite by SAMBON (*Ann. Mag. Nat. Hist.* (9) xx. 1927, p. 157) is here briefly redescribed by Hirst, who is inclined to regard it as identical with the *Trombicula pseudo-akamushi* of HATORI. It has various local names—scrub itch mite, tea-tree itch mite—in different parts of Australia, where it is extremely abundant during the hot season and is then a cause of an irritating dermatitis. [*T. hirsti* is one of the numerous mites referred to by SAMBON again in 1928, see this *Bulletin*, Vol. 25, p. 833].

A. A.

SHELMIRE (Bedford) & DOVE (Walter E.). **The Tropical Rat Mite, *Liponyssus bacoti* Hirst, 1914 : the Cause of a Skin Eruption of Man, and a Possible Vector of Endemic Typhus Fever.**—*Jl. Amer. Med. Assoc.* 1931. Feb. 21. Vol. 96. No. 8. pp. 579–584. With 5 text figs. [5 refs.] [Med. College, Baylor Univ., Dallas, Texas.]

This is an account in very full detail of about 200 cases of "rat-mite dermatitis" reported from various towns in Texas and caused by *Liponyssus bacoti* (HIRST). The mite is figured, as well as a patient showing "wheals and papules varying in size from that of a pinhead to that of a pea" scattered like an exanthema all over the back and nape. The female mite when replete leaves her host and takes shelter in a crevice, where she lays 3 to 8 eggs, which hatch in 4 to 6 days. The larvae die if they do not find a host within 12 days. Finding a host (rat or mouse) they remain attached for about 2 days and then drop off to moult. There are said to be 4 or 5 feeds with intervening moults before the adult stage is attained, and that this succession of events may occur on the same host or on several hosts. On man an adult mite may take several feeds. When bites are very numerous the patient may have transient fever. Concurrently with rat-mite dermatitis endemic typhus fever made its appearance in northern and eastern Texas and the authors suggest that the mites (*Liponyssus bacoti*) may be the carriers of the infection.

A. A.

WILBERT (R.) & DELORME (M.). "Pastoria", centre de recherches biologiques et d'élevage de singes, Institut Pasteur de Kindia, Guinée française. [**"Pastoria," Biological Research Centre and Simiary, Pasteur Institute of Kindia, French Guinea.**]—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 131–148.

[Introductory part by M. Wilbert. Pathology by M. Delorme.]

The organization of "Pastoria" the institution in French West

Africa for the preservation, propagation, and scientific investigation of the Ape and Monkey Kind—has already been noticed in this *Bulletin* (Vol. 21, p. 672); in the present paper we find some account of the behaviour and psychology and of the pathology of its simian community, prefaced by some trenchant animadversions against the barbarities practised by those who catch our humble fellow-Primates for the market, and an appeal for some State control of that ignoble trade.

The simian inmates of the institution are mainly chimpanzees, but also include species of *Colobus*, *Papio* (*Cynocephalus*), *Cercocebus*, and *Cercopithecus*. Chimpanzees are for the most part kept in progressive liberty, under the surveillance of keepers who walk them out, in orderly schools of 10 to 15, or even 30, for daily exercise and play in the forest, where they are allowed to climb in some big tree and to skylark with each other and with their keepers in some clearing. Thus they get accustomed to human society, and come to regard man as a friend, and at the same time learn the great lesson of obedience—the lesson that of late has become so musty among some of the reforming teachers of the young of our own species. For about the first four or five months of its life the young chimpanzee is a nursling, but at seven or eight months it begins to be inquisitive about stronger food. At 5 or 6 years it is making sounds and gestures of an intelligent, purposive and imitative kind, is impulsive and capricious like a child, shows fear and sympathy, and can be angry. A little before the age of 10 the sexual instincts begin to show. At about 30 years of age the chimpanzee is an old man, and his younger fellows let him know that even in the unsophisticated chimpanzee community “Crabbed Age and Youth cannot live together”. His body is bent, his face wrinkled, his limbs are crooked, and his nails brittle and broken—a sorrowful picture.

Specialists in mental disease would find much instructive study in the chimpanzee. The author mentions a case of extravagant mental derangement associated with symptoms very much like general convulsive tic in a young male about 7 years old.

The lower, non-anthropomorphoid, monkey species do not have the same liberty as the chimpanzees, and indeed are not worthy of it; but they have specially large cages, partly in the open air, partly protected from weather, for exercise and amusement, as well as smaller cages for resting and refreshment.

The diseases observed include the following: A very virulent dysentery, due to a filter-passing virus and sometimes epizootic, in chimpanzees and communicable also to *Cercopithecus callitrichus*. A fusospirillar infection, also in chimpanzees, which at first is localized in the mouth and pharynx but may spread to the respiratory tract, or to the alimentary where it may cause a pseudomembranous enteritis with lesions strikingly like those of Vincent's angina; in the mouth also it may sometimes lead to necrosis of jaws and palate which may be followed by serious general mischief. The intestinal parasites observed are *Oesophogostoma watsoni*, *Necator americanus*, *Trichuris trichiura*, *Strongyloides stercoralis*, *Enterobius vermicularis*, *Watsonius watsoni*, and *Parocephalus armillatus*; the blood parasites are *Microfilaria perstans* and a Plasmodium somewhat resembling *P. vivax*, both of them in the chimpanzee and *C. callitrichus*. The “marvellous” preventive efficacy of the B.C.G. antitubercle vaccine, whether administered by mouth or subcutim, has been demonstrated. Both

chimpanzee and *C. callitrichus* (but not the other monkeys) have proved susceptible to the virus of herpes and to neurovaccine (as also have two species of civet cats). A *Cercopithecus* was proved to be susceptible to a human infection of *Trypanosoma gambiense*.

Other pathological observations here recorded have no concern with apes or monkeys; they relate to an epidemic of rabies in Kindia; to outbreaks of avian typhus and avian cholera in fowls; and to co-operation in an antilocust campaign.

In the sequel M. Marcel LEGER, to illustrate simian psychology, tells the sad story of a large black mother chimpanzee captured, with her dying baby in her arms, in her native land. For hours after the death of the nursling she emitted heartrending cries whenever its dead body was brought to her, and her signs of grief were afterwards plangent whenever the young of her kind passed her cage. In course of time this mother, being considered too dangerous for employment, was sentenced to the poison-cup; but she would not touch either orange or banana into which strychnine had been delicately injected, although she would take a good fruit even if it had been broached.

A. A.

GAIDE. Note sur un poisson toxicophore du Tonkin le "Ca-Noc". [**Note on the "Ca-Noc," a Toxic Fish of Tonking.**—*Bull. Soc. Méd. Chirurg. Indochine*. 1931. Mar. Vol. 9. No. 3. pp. 150-152. With 1 coloured plate.

Description with coloured figure of the *Ca-Noc*, a well known globe-fish of the *Tetrodon* genus, poisonous as food. The author speaks of three "varieties" of this fish in Annam—two in fresh water and one marine. The poison is particularly abundant in reproductive glands, liver, intestine and head. Nothing is said here about the acute gastro-intestinal irritation that usually follows eating other species of *Tetrodon*, although emetics and purgatives and stomach-pump are mentioned in treatment; but emphasis is given to the alternating paroxysms of convulsions and collapse that occur in bad cases. Three such cases are briefly noticed, one of which treated as for mushroom-poisoning, recovered.

A. A.

VELLARD (J.). Venin des raies (*Taeniura*) du Rio Araguaya (Brésil). [**The Venom of Rays (*Taeniura*) of the River Araguaya (Brazil).**—*C.R. Acad. Sci.* 1931. May 18. Vol. 192. No. 20. pp. 1279-1281.

Two species of sting-rays of this genus are common in the Araguaya and its tributaries. Wounds inflicted by their venomous spines are extremely and persistently painful, numbing and paralysing a limb and causing much local swelling that goes on to destructive necrosis. Such accidents are common, but are rarely fatal.

The author's experiments on animals were made both by using the fresh spine as a weapon and by injecting watery or saline or glycerine extracts of the tissue that fills its groove; such extracts are weak and very soon lose their activity. Injections into muscle or subcutis cause, besides pain, local muscular contractions, tremors and even general chronic convulsions. Mortal doses are quickly followed after pain and excitement by feeble paralysis, disappearance of reflexes, and death. After non-mortal doses, besides the local effects described at the outset, progressive

atrophy of the injected limb may follow. In all animals (mammals, birds, reptiles, batrachia) respiratory troubles are a constant and early feature, and also increased secretion, salivary, nasal and lacrymal (in the toad, only a general exudation of its venom). The dog generally succumbs to a wound from a venom-spine. The toxins of the venom are destroyed by 5 minutes boiling, by strong acids, and by alcohol.

A. A.

VELLARD (J.) & VIANNA (M. Miguelote). Pesquisas experimentaes sobre o veneno do sapo commum do Brasil (*Bufo marinus* Linn.). (1ª memoria.) [**Experimental Study of the Venom of *Bufo marinus* Linn. the Common Toad of Brazil. Part I.**—*Mem. Inst. Oswaldo Cruz*. 1931. Feb. Vol. 25. No. 1. pp. 1-46. With 27 figs. on 12 plates. [18 refs.] French summary. [Bios Inst., Nictheroy, Brazil.]

A fine experimental [and historical] study. By whatever route introduced the venom of *Bufo marinus* had the same effect on all the experimental animals—cat, dog, guineapig, rabbit, horse, pigeon, snakes, lizards, batrachia, fish, and certain crustacea and insects. There is an initial phase of excitation (heart, lungs, lacrimal and salivary secretion followed by convulsions, and a phase of depression and paralysis with gradual failure of breathing and stoppage of the heart. When introduced subcutim there is also much oedema and local haemorrhage, followed by foetid gangrene. Introduction into the conjunctival sac or the nasal or buccal mucosa causes local ischaemia and anaesthesia followed by dolorous congestion and hyper-secretion, and in the case of the eye perhaps panophthalmia. By whatever method injected the poison "accumulates", and initial anaphylaxis occurs at each fresh injection. At autopsy, if death has been quick, there are found endothelial and visceral haemorrhages, cardiac infarcts, and perhaps pulmonary oedema; and if slow, much perivascular inflammation in liver, spleen, kidneys, and medulla.

A. A.

DE MAGALHÃES (Octavio). Escorpionismo com duas observações de accidente pela picada do *Tityus serrulatus* (Lutz et Mello, 1922). [**Scorpion Sting with Description of Two Cases.**—*Rev. Med.-Cirurg. do Brasil*. 1931. June. Vol. 39. No. 6. pp. 190-194. With 3 figs. on 2 plates. [Ezequiel Dias Inst., Bello Horizonte, Brazil.]

Studying the question of the effects of scorpion stings the author has noted the marked proteolytic action of *T. serrulatus* as compared with *T. bahiensis*. Other important symptoms occasionally present are fall of temperature as low as 35° C. (5 times out of 161 cases observed), coming on even in an hour or so if the poison is injected into a vein, vasomotor paralysis evidenced by dilatation of the pulmonary vessels and subacute oedema of the lung, tremors and marked drowsiness.

The first case here recorded was a man of 21 years stung on the middle finger of the right hand by a scorpion hidden among some bricks. There was immediate acute pain extending to the axilla, where an adenitis developed. The finger began to swell 3 days after the prick, necrosis set in and the finger had to be amputated; local treatment and the use of compresses of scorpion antivenin were ineffectual. The second patient was a boy of 15 years, stung twice on the inner surface of the right thigh when he was asleep. Pain was severe and he vomited a clear viscid fluid and the mouth and nostrils "filled with water", he had intense headache, attacks of shivering, temperature 37.5° C., pulse 98, irregular, and a

glycosuria [amount not stated] which passed off in 48 hours. The scorpion in each case was *T. serrulatus* and both patients recovered. The author has collected accounts of 161 cases and 40 deaths from scorpion stings.

H. H. S.

REGENDANZ (P.) & REICHENOW (E.). Ueber Zeckengift und Zeckenparalyse. [**Tick-Venom and Tick-Paralysis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. May. Vol. 35. No. 5. pp. 255–273. With 3 text figs. [10 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The authors relate and discuss their experiments with the venom of a very widely distributed tick, *Rhipicephalus sanguineus*, and in rather over-cautious language they express their opinion that the results throw some light on the cause of Tick-Paralysis. Their conclusions are as follows: The venom is formed when the eggs are developing, and accumulates chiefly in the ovarian eggs (the experiments on animals were made with such eggs). Neither the larvae nor the adult female before she has tasted blood contain it in any appreciable quantity. Its properties are comparable with those of other Arachnoid venoms. It was very active when introduced into the animals tested—dog, rabbit, guineapig, rat, mouse, and canary—causing a progressive motor paralysis resembling the disease “described as tick-paralysis”; in fact “the venom of tick-paralysis is evidently identical with the venom of *Rhipicephalus* eggs”. The results (subcutaneous or peritoneal introduction) were not immediate, but in the course of a few days the paralysed animals died, and exhibited extensive degenerative processes of the central nervous system. A few [unpropitious but not quite decisive] experiments, on dogs, on the question of acquisition of immunity through graduated doses of the venom, are recorded.

A. A.

- i. ARTHUS (Maurice). Les anavenins. (Deuxième mémoire.) Immunisation par les anavenins. [**Anavenins. Fasc. II. Immunization by Anavenins.**]—*Jl. Physiol. et Path. Gén.* 1930. Dec. Vol. 28. No. 4. pp. 773–788.
- ii. —. Les anavenins. (Troisième mémoire.) Anaphylaxie engendrée par les anavenins. [**Fasc. III. Anaphylaxis engendered by Anavenins.**]—*Ibid.* pp. 800–815.

i. Since formolized snake-venoms are innocuous and antigenous they may justly be homologated with anatoxins and be called anavenins. Like anatoxins they have immunizing properties—which are particularly conspicuous in anacobra-venin—after several successive subcutaneous injections (into rabbit). The antigenous powers are really the property of the anavenin, and are not due to a minute quantity of venom remaining unchanged in the anavenomous liquid. This paper contains in full detail the evidence upon which these generalizations and their qualifications are based.

ii. An exaggerated (proteotoxic) anaphylactic shock—shown in long and lasting arterial depression and accelerated breathing—is one of the phenomena engendered by the intravenous injection of venom of cobra or of *Crotalus* into rabbits previously sensitized by anacobra-venin or anacrotalus-venin. This anaphylaxis engendered

by anavenins is no more specific than that engendered by venoms, and very minute quantities of anavenins can bring it about. The experiments are described and tabulated in this paper.

A. A.

MIHASKAR (K. S.) & CAIUS (J. F.). **Indian Plant Remedies used in Snake-Bite.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1931. Jan. Memoir No. 19. 96 pp. [42 refs.] [Haffkine Inst., Bombay.]

"From time to time 'infallible cures', 'certain antidotes', and 'never-known-to-fail remedies' [for snake-bite] are sent to me from all parts of the world to be submitted to the crucial test of experiment, always with the same result—utter failure". So wrote Vincent RICHARDS in 1886.

"The words quoted above", say the authors in their second paragraph, "might be placed on the lips of any one of the Directors of the Haffkine Institute, and they would very nearly sum up their experience during the period beginning October 1896 and ending July 1930." And this is their verdict after having tested "314 individual plants and 184 combinations": "We have every reason to believe that our work is exhaustive, and we may safely conclude that none of the Indian plants recommended for the treatment of snake-bite has any preventive, antidotal, or therapeutic effect."

In their tests the experimental animal was always the stray dog—unless otherwise stated—from 6 to 12 kilograms. Each test necessitated the use of four animals, two for colubrine (cobra) and two for viperine (Russell's viper) venom; the dose of venom was calculated so as to give a lease of life of not less than two hours; the dosage of the "remedy" to be tested was (wherever possible) that indicated in the literature at the authors' disposal, in other cases they were calculated from the therapeutic data available.

The list of medicinal plants, indigenous or imported, used in the treatment of snake-bite includes 322 species arranged alphabetically by their botanical names. The more commonly known sanskrit name of those mentioned in Ayurveda literature is also given. The descriptive detail allotted to each species varies of course, it usually includes a short description of the plant, its geographical distribution, its properties, and the parts used in the treatment, and the manner of their preparation and administration. Following the list of plants there is a list of Ayurvedic preparations used in the treatment of snake-bite.

The introduction to the paper takes notice of a few instances of remedies taken from the records of the last twenty years. They illustrate the philosophy of Carlyle's essay on Morrison's Pill rather than the progress of scientific medicine.

A. A.

STILES (C. W.) & HASSALL (Albert). **Key-Catalogue of the Crustacea and Arachnoids of Importance in Public Health.**—*Hyg. Lab. Bull. No. 148.* Washington. 1927. Apr. pp. iv+197-289.

This is an index expurgatorius of Crustacea, Arachnida, and Myriapoda that distress Man when ingested as food, and as mechanical polluters of food, and as parasites and intermediary hosts of parasites,

and as inflicting wounds, and as having dangerous venomous properties, and as being found in graves or on corpses; and it also includes those few that have a minor use in therapeutics. It is a "key-catalogue" and reeks of the midnight oil and the synoptical apparatus of the librarian; it is itself the quintessence of abstraction and abridgement.

A. A.

FAUST (Ernest Carroll). **The Nosogeography of Parasites and their Hosts.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 373–380. With 2 figs. [Dept. of Trop. Med., Tulane Univ., New Orleans.]

A good general lecture at the School, on natural conditions and circumstances that influence the dispersal and the circumscription of animal parasites.

A. A.

BAISAS (F. E.). The Barbirostris-hyrcanus Group of the Philippine Anopheles.—*Philippine Jl. Sci.* 1931. Apr. Vol. 44. No. 4. pp. 425–448. With 7 text figs. & 3 plates. [49 refs.]

BARRAUD (P. J.). Notes on Some Indian Mosquitoes of the Subgenus *Stegomyia*, with Descriptions of New Species.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 221–228. With 18 figs. on 1 plate. [2 refs.]

BARRAUD (P. J.) & CHRISTOPHERS (S. R.). On a Collection of Anopheline and Culicine Mosquitoes from Siam.—*Records of the Malaria Survey of India.* 1931. June. Vol. 2. No. 2. pp. 269–285. [11 refs.]

CHRISTOPHERS (S. R.) & PURI (I. M.). Species and Varieties of the *funestus* Series of Anopheles.—*Records of the Malaria Survey of India.* 1931. Sept. Vol. 2. No. 3. pp. 481–493. With 2 text figs. [7 refs.]

COVELL (G.). The Distribution of Anopheline Mosquitoes in India and Ceylon: Additional Records, 1926–1930.—*Records of the Malaria Survey of India.* 1931. June. Vol. 2. No. 2. pp. 225–268. [6 pages of refs.]

CURRY (Dalferes P.). *Anopheles (Anopheles) neomaculipalpus* [sic]. A New Species of the *Arribalzagaya* Group of *Anopheles* from Panama.—*Amer. Jl. Hyg.* 1931. Mar. Vol. 13. No. 2. pp. 643–647. With 1 text fig. [2 refs.] [Gorgas Memorial Lab., Panama.]

EVANS (A. M.). Notes on African Anophelines.—*Ann. Trop. Med. & Parasit.* 1931. Mar. 31. Vol. 25. No. 1. pp. 129–143. With 6 text figs. [7 refs.]

GABALDON (Arnoldo). Nota sobre distribución de protozoos intestinales basada en el examen de 2000 muestras.—*Gac. Med. de Caracas.* 1930. Dec. 15 & 31. Vol. 37. Nos. 11 & 12. pp. 165–169; pp. 181–190. [60 refs.]

INCE (H. T.). A Case of Acute Pulmonary Oedema in an Adult, as the Result of a Scorpion Sting.—*Indian Med. Gaz.* 1931. Apr. Vol. 66. No. 4. pp. 200–201.

KHAW (O. K.) & HOEPFLI (R.). Ekto- und Endoparasiten chinesischer Bettler in Peiping.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Aug. Vol. 35. No. 8. pp. 443–448. [6 refs.] [Peiping Union Med. College, Peking.]

KURUP (P. K.). A Case of Myiasis of the Nasal Fossa.—*Indian Med. Gaz.* 1930. Aug. Vol. 65. No. 8. p. 450.

LOIZE (Harald). Die künstliche Proteosomainfektion der Vögel. Ein Beitrag zur Frage der Immunität und Immunisierung bei Vogelmalaria. II. Mitteilung.—*Zent. f. Bakt.* 1. Abt. Orig. 1931. Feb. 23. Vol. 120. No. 1/2. pp. 107–113. [5 refs.] [Hyg. Inst., Univ., Greifswald.]

NIESCHULZ (Otto). Ueber Luftfeuchtigkeit in Insektenzuchtzimmern.—*Zent. f. Bakt.* 1. Abt. Orig. 1931. Vol. 121. pp. 519–520. [Inst. for Parasit. & Infect. Diseases, Reich Univ., Utrecht.]

NIESCHULZ (Otto) & BOS (A.). Einige Versuche mit überwinternden Exemplaren von *Culex pipiens*.—*Zent. f. Bakt.* II. Abt. 1931. Vol. 84. pp. 364–368. [6 refs.] [Inst. for Parasit. & Infect. Diseases, Reich Univ., Utrecht.]

- NITZULESCU (Georgette) & NITZULESCU (Virgil). Essai de table dichotomique pour la détermination des phlébotomes européens.—*Ann. Parasit. Humaine et Comparée*. 1931. Mar. 1. Vol. 9. No. 2. pp. 122-133. With 15 text figs. [20 refs.] [Parasit. Lab., Faculty of Med., Paris.]
- NITZULESCU (Virgil). Sur la présence en Yougoslavie du *Phlebotomus perniciosus* var. *tobbi* Adler, Theodor et Lourie, 1930.—*Ann. Parasit. Humaine et Comparée*. 1931. May 1. Vol. 9. No. 3. pp. 266-270. With 4 text figs. [5 refs.] [Parasit. Lab., Faculty of Med., Paris.]
- SCHEVTSCHENKO (F. J.). Die Artmerkmale der Larven von *Phlebotomus papatasi*, *Phl. chinensis*, *Phl. sergenti* und *Phl. caucasicus* (Marzinovsky) s. li (Popoff).—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Sept. Vol. 35. No. 9. pp. 526-537. With 16 text figs. [San. Bact. Inst., Tashkent.]
- SCHWERTZ (J.). Note préliminaire sur les moustiques de quelques régions de la province orientale (Congo Belge).—*Ann. Soc. Belge de Méd. Trop.* 1930. Dec. 31. Vol. 10. No. 4. pp. 429-438. [4 refs.]
- SENIOR-WHITE (Ronald). A New Biting Ceratopogonine from India.—*Arquivos da Escola Méd.-Cirurg. de Nova Goa*. Ser. A. 1931. No. 6. pp. 713-714. With 9 figs. on 1 plate.
- SHANNON (Raymond C.) & FROBISHER (Martin), Jr. A Comparison of the Effect of Various Substances upon Larvae of *Aedes aegypti*.—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 426-432. [2 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]
- SINTON (J. A.). *Phlebotomus stantoni* Newstead, 1914 and Some Other Siamese Sandflies.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 99-106. With 12 figs. on 1 plate. [11 refs.]
- SINTON (J. A.). Notes on Some Indian Species of the Genus *Phlebotomus*. Part XXIX. *Phlebotomus arboris* n. sp.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 107-112. With 13 figs. on 1 plate. [2 refs.]
- TSUCHIYA (H.). A Study on Variabilities in Dimensions and Numbers of Discharged Cysts of *Giardia lamblia* (Stiles, 1915) from Day to Day under Normal Conditions.—*Amer. Jl. Hyg.* 1931. Mar. Vol. 13. No. 2. pp. 544-567. With 2 graphs in text. [19 refs.] [Johns Hopkins School of Hyg. & Public Health, Baltimore.]
- VIEIRA (F. Borges) & DA SILVEIRA (G. Fleury). Protozoários intestinaes no homem na cidade de São Paulo.—*Bol. Inst. Hyg. de São Paulo*. 1931. No. 47. 11 pp. Reprinted from *São Paulo Médico*. 1931. Jan. Vol. 2. No. 1. [2 refs.]
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REVIEWS AND NOTICES.

BLACKLOCK (D. B.) [M.D. (Edin.), D.P.H. (London), D.T.M. (Liver.), etc.] & SOUTHWELL (T.) [D.Sc., Ph.D., A.R.C.Sc., F.Z.S., F.R.S. (Edin.), etc.]. **A Guide to Human Parasitology for Medical Practitioners.**—pp. viii+271. With 2 coloured plates & 122 text figs. 1931. London: H. K. Lewis & Co. Ltd. [15s.]

It seems to the reviewer that there is a real need for two kinds of scientific text books only—exhaustive treatises wherein the reader can reasonably expect to discover the present state of knowledge concerning the subjects dealt with; and elementary books which confine themselves to main facts and principles, which are written in simple and possibly even dogmatic language, and are of such reasonable size that they can be mastered by the average student whilst attending one of the recognized courses of instruction. Long experience in teaching all sorts and conditions of students has shown how great is the necessity for both these types of volume, and how often text-books, many of which are of undoubted merit, fail simply because they attempt a compromise between these two ideals: in the words of a student, “They are too much and not enough.” To the teacher of Parasitology there is available a number of excellent comprehensive treatises dealing with the various branches of his subject, but to assist him in the instruction of what must inevitably constitute the great mass of his students—the beginners—there is a surprising dearth of suitable text books. For the production of a really good elementary text-book are required not only a wide knowledge of the subject, and prolonged experience in teaching, but also considerable courage, as the work entails much labour and its reward is often the ill-concealed contempt of critics and pedants.

The present volume is, in the reviewer's opinion, a successful attempt to meet what he has long recognized as a very urgent need—a small concise text-book suitable for students commencing a study of Parasitology, and particularly for those who are taking the course of instruction prescribed for the Diplomas of Tropical Medicine and Public Health. The mastery of its contents within a period of three months should be well within the capacity of the average student; and provided the reading is supplemented by practical work in the laboratory, which is of course indispensable, he should at the end of his course have an adequate working knowledge of the subject.

Recognizing the fact that the student must appreciate the zoological relationship of the various animal parasites, if he is to have any clear and lasting conception of the subject of Parasitology, the authors have carefully explained the system of zoological nomenclature and classification, and have arranged their matter according to zoological principles.

In addition to descriptions and life histories of the spirochaete, and the protozoal and helminth parasites of man, the authors have given an account of the methods usually adopted for the examination of blood, faeces, urine and puncture fluids. They have carefully avoided the more elaborate methods, and have confined themselves to simple methods suitable for the practitioner whose duty it is to diagnose and treat tropical diseases.

A notable feature of great value in the volume is the provision of a series of eleven tables which are easy of reference and summarize the information given in the text; one is a revision table of the diagnostic features of all the parasites. The life-histories of the helminth parasites are pictorially represented in a series of diagrams.

Careful elimination of non-essentials, which is required in order to produce a book of this nature, is, as everyone with experience will admit, a very difficult task. It could only be accomplished with any degree of success by persons such as the authors, who have had long experience of

the difficulties which beset students in their studies of the parasites; the fact that both authors have extensive acquaintance with the conditions under which practitioners have to work in the tropics adds great value to their exposition.

The book is beautifully printed and the numerous illustrations are excellent. Both authors and publishers are to be congratulated on the production, at so moderate a price, of a book which is certain to prove invaluable, not only to the student, but to those engaged in the practice of Tropical Medicine.

W. Yorke.

PURI (I. M.). Larvae of Anopheline Mosquitoes, with Full Description of those of the Indian Species.—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1931. June. Memoir No. 21. pp. vi+227. With 47 plates. [5 pages of refs.] [Central Research Inst., Kasauli.]

This is a comprehensive, careful, and judicious piece of work by an observer who knows the larvae of the Indian anophelines in their natural waters as well as in the laboratory, and is equally conversant with their parents. Fifteen pages are given to bionomy—habitats and provenance, habits, food and manner of feeding, moulting and term of larval life—and to all the technique of study. A very precise and particular description of the surface anatomy of the full-grown larva of the fourth (final) stage and a critical account of each of the three preceding stages, together with a brief notice of some not uncommon abnormalities, occupy 34 pages. The subject and the schemes of classification are dealt with in 33 pages, the 44 Indian species (and also certain varieties) are described in 158 pages, and the text concludes with 5 pages of references.

With regard to classification of anopheline larvae the author is admirably judicious. He is satisfied that those studied by himself can be segregated on larval characters in groups that "more or less correspond" with the generally accepted classification of adults, and he is content with the rational declaration that "for any classification of this tribe [Anophelini] to be really adequate, the characters of the larvae will have to be considered along with those of the adults." In the identification of the different species of anopheline larvae useful characters are found in the arrangement and form of the various hairs of the clypeus and frontal region, of the pleural hairs of the thorax, and of the lateral hair on abdominal segments 3 to 6. By this method anopheline larvae form two Divisions one (A) for the S. American Chagasia, which has only 2 pairs of normally placed frontal hairs and the outer anterior clypeal hair transformed to a stout spine; the other (B) including all other known anopheline larvae, with 3 pairs of frontal hairs forming a line, and a normal outer anterior clypeal hair. The big Division B can be brigaded in four subdivisions, namely: (1) larvae having the inner anterior clypeal hairs set close together, the antennal hair branched, and the long lateral hair of abdominal segments 4 and 5 split into 2 to 5 branches—e.g., *A. maculipennis*, *A. barbirostris*; (2) those having the said clypeal hairs set fairly close together and the antennal hair branched, but the very long lateral hair of abdominal segments 4 to 6 almost always simple—a section that includes only the ten Tropical American species resembling *A. argyrotarsis* and *A. tarsimaculatus*; (3) those having the antennal hair very short and simple (except *A. asiaticus* which has it split into 3-5 branches), the frontal hairs much reduced and some or all sometimes simple, and the lateral hair of abdominal segments 4 to 6 very long and feathered—e.g., *A. plumbeus*, *A. barberi*; and (4) those having the inner anterior clypeal hairs set wide apart and the antennal hair very short and simple—a large section that includes most of the Old World species, and is subdivided in 6 groups. Using the characters of the "hairs" and setae the author has devised three synoptic tables for the

identification and correlation of the Indian anopheline larvae—a “ simple ” table, an “ advanced ” table, and a table of affinities.

The account of the different species of Indian larvae comprises surface anatomy in very full detail, habitat, provenance, and geographical distribution, the descriptive anatomy being based for the most part on material collected, reared and otherwise handled by the author himself ; also, where necessary, comparative detail and previous descriptions of species. The text is sufficiently illustrated in 47 excellent plates.

A. Alcock.

PURI (I. M.). **Synoptic Tables for the Identification of the Full-grown Larvae of the Indian Anopheline Mosquitoes.**—*Health Bull. No. 16. Malaria Bureau No. 7.* 65 pp. With 79 figs. 1930. Calcutta : Govt. of India Central Publication Branch. [As. 6 or 8d.]

This is a very useful publication. It opens on a very careful description, supplemented by large plain instructive text-figures, of the surface anatomy and adjuncts of the anopheline larvae. Then follow brief practical instructions for collecting and breeding the larvae, and full directions for fixing and preserving and mounting them. There are two separate synoptic tables for identifying the full-grown larvae ; one of them ignores varieties, the other includes them ; both of them are riveted with text-figures. An alphabetical list of all the species of Anopheles found in India, with the commonest breeding-places and the broad geographical distribution of each species forms the conclusion.

A. Alcock.

SENN (Ernst) [Dr. Med.]. **Theodor Bilharz. Ein deutsches Forscherleben in Ägypten 1825-1862.** [Theodor Bilharz. A German Naturalist's Career in Egypt, 1825-1862.]—*Schriften des Deutschen Ausland-Instituts Stuttgart.* Reihe D : Biographien und Denkwürdigkeiten. Band 5. 76 pp. With 17 figs. on 5 plates. 1931. Stuttgart : Ausland und Heimat Verlags-Aktiengesellschaft. [Bound Rmk. 4. ; Unbound Rmk. 3.]

In the middle of the nineteenth century those concerned with the causation of disease were busily engaged in the study of the helminth parasites and their transmission, for the science of bacteriology was for them but as a distant cloud. PRUNER's rediscovery of DUBINI's hookworm had roused suspicions regarding its clinical significance in Egypt and had directed attention to overseas countries as new and fruitful fields of investigation. HERUST had just solved the life history of the *Trichina* worm by feeding experiments, and this new experimental method was soon to give other sensational results in the successful investigations of KUCHENMEISTER and v. SIEBOLD on the mode of spread of the *Taenias*.

At this moment a political change of great importance occurred in Egypt. The Francophile Viceroy Mehemed Ali died and his successor Abbas I replaced CLOT Bey and other French administrators and teachers by others of German nationality. The triple post of Director of the Medical School, President of the Sanitary Council and personal Physician to the Viceroy was offered to Dr. GRIESINGER, Professor of Pathology at Kiel and the Chair of Surgery to Dr. REYER of Vienna. GRIESINGER, delighted at the prospect of investigating diseases in an unexplored land, sought an assistant with leanings towards natural history, and his choice fell upon Dr. M. T. BILHARZ a former pupil, then 25 years of age, who had

just completed his medical studies at Tübingen. Before sailing for Egypt, BILHARZ received from another of his teachers, VON SIEBOLD, the advice to investigate the Entozoa of man and the morphology and histology of the electric fish of the Nile, these being the two most promising lines of research at that time. During the first 17 months of their stay in Egypt, GRIESINGER and BILHARZ performed over 400 post-mortems, and within one year BILHARZ was able to send to v. SIEBOLD a long letter describing three new entozoa of man which he wished to name "*Haematobium dispar*," "*Taenia aegyptiaca*" and "*Distomum intestinale*"; but were eventually called *Distomum haematobium*, *Taenia nana* and *Distomum heterophyes*. In further communications during the second year other parasites including the hookworm and the guineaworm, were noted and the relation of the new blood fluke to lesions in the bladder wall were discussed. At that time v. SIEBOLD was editor of the *Journal Zeitschrift für Wissenschaftliche Zoologie*, and in 1853 he published these results in an article compiled from the more important portions of BILHARZ's letters, together with a number of editorial comments. With this publication BILHARZ's helminthological work may be said to have ceased. His chief, GRIESINGER, had not proved a success either as an administrator or as a colleague in the medical community, and in the spring of 1852 had resigned and returned to Europe. BILHARZ was then transferred to the surgical section of the Hospital under Professor REYER and appears to have sought, unsuccessfully, for a medical post on the Red Sea, chiefly in the hope of securing an opportunity to study its little known fauna. The Crimean War in 1854 brought great unrest in Cairo and the Medical School was temporarily closed. In 1855 BILHARZ succeeded to the Professorship of Clinical Medicine but to qualify himself for these new duties he had to abandon for a time the researches on the electric fish on which he had been engaged since 1852. With the death of Abbas I in 1856, the restoration of French influence, the departure of Dr. REYER and the return of CLOT Bey, BILHARZ's position became increasingly difficult but he found a quiet haven in the Professorship of Descriptive Anatomy. In 1858 CLOT Bey, tired in turn of international intrigue, like GRIESINGER and REYER, resigned and the Medical School was for many years afterwards carried on chiefly by native teachers. BILHARZ, after a brief holiday in Europe in 1858, returned to his duties again; but in private practice he had now to make up for the remissness of the Egyptian Treasury, and it was only through the political pressure of the Duke of Coburg-Gotha that, in the spring of 1862, he received arrears of salary for the previous 28 months. A few weeks later he died of typhoid fever at the early age of 37, and was buried at old Cairo.

Of this sadly broken career, Dr. Senn has written a fascinating memoir containing much concerning BILHARZ's personal life and friendships which has hitherto been buried in private correspondence. His story is one of a shy and retiring personality whose worldly ambitions were fulfilled with the satisfaction of few simple needs and whose main interests and consolation in life lay in nature study. His parasitological discoveries were, for BILHARZ, but new and interesting facts in natural history. It remained for later workers to elucidate their fundamental importance in relation to preventive medicine.

One must admire the care and thoroughness with which Dr. Senn has conducted his bibliographical researches and congratulate him on the results. One of the most surprising is the discovery that the generic name *Bilharzia* heretofore attributed to Cobbold 1859 had appeared in a monograph "*Mikrogeologie*" printed and published in 1856 as a posthumous work of one of BILHARZ's many friends, Dr. MECKEL VON HEMSBAACH. Those who regretted the displacement of the generic name *Bilharzia* Cobbold, 1859 by *Schistosoma* Weinland, 1858 under the Law of Priority will rejoice in the restoration of *Bilharzia* Meckel, 1856 under the same Law.

R. T. Leiper.

BUREAU OF HYGIENE AND ~~TROPICAL~~ DISEASES.TROPICAL DISEASES
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[No. 3.

MEDICAL ZOOLOGY.

VENOMOUS SNAKES AND SNAKE VENOMS.

Treatment of Snake-bite.—GHARPUREY¹ records a case of bite by *Echis carinatus* (identified) reasonably believed to have been cured by 40 cc. of Kasauli antivenene. The case presented the usual symptoms, except that the bite was not very painful, and received the usual local treatment and also a mixture containing CaCl_2 . Complete recovery in 3 weeks.

GHARPUREY² also relates a case of cobra-bite successfully treated in the classical way, which included 80 cc. of antivenene, and some adrenalin (to counteract signs of anaphylaxis). The cobra in this case had only one fang, but injected sufficient venom to cause a general tingling and numbness of the body, signs of ptosis, and obvious loss of coagulability of the blood, but not enough to embarrass the breathing or affect the pulse. The patient was treated within ten minutes of being bitten (below the thumb) and was "practically normal," after an anxious interval of treatment, four hours afterwards.

CRIMMINS³ ably discusses the real meaning of the term "snake-bite," states that the Diamond-back rattle-snake of Texas may discharge 9 to 40 lethal doses of venom at one bite, and describes a case of bite from that snake, emphasizing the shock and the swelling, and concentrating on treatment of shock and of haemolysis. A tourniquet was kept on for four hours, mechanical suction was applied, and antivenom injected (intramuscular); subsequently glucose was injected (intravenous) at intervals during three days, and blood-transfusion made on the 4th day. Patient discharged on 36th day.

VELLARD⁴ has tested sparteine, adrenalin, strychnine, caffeine, morphine, atropine, cocaine, pilocarpine, digitaline, camphorated oil,

¹ GHARPUREY (K. G.). A Case of Echis Bite.—*Indian Med. Gaz.* 1931. Mar. Vol. 66. No. 3. pp. 144-145.

² GHARPUREY (K. G.). Case of Recovery from Cobra Bite.—*Indian Med. Gaz.* 1931. Oct. Vol. 66. No. 10. pp. 569-570.

³ CRIMMINS (M. L.). Treatment of Shock in Rattlesnake Bites.—*Milit. Surgeon.* 1931. July. Vol. 69. No. 1. pp. 42-44. [1 ref.]

⁴ VELLARD (J.). Acções phylacticas não específicas em relação aos venenos ophidicos. [Prophylactics and Specifics against Snake-Venoms.]—*Rev. Med.-Cirurg. do Brasil.* 1931. Jan. Vol. 39. No. 1. pp. 2-32. [23 refs.] French summary.

and Mn_2Cl_6 in various ways on pigeons intoxicated with venom of *Crotalus terrificus*, *Lachesis jararaca*, and Indian cobra, and he thinks some of them, particularly sparteine and adrenalin, might be useful as complements to serotherapy.

Antivenoms.—G. C. MAITRA & M. L. AHUJA⁵ having at their disposal some long-stored "time-expired" Kasauli anticobra-daboia serum, which is commonly supposed to keep good for a year and in a plus 25 per cent. dosage for the following year also, carefully tested its power on series of 300 gm. pigeons, injecting 2 cc. of an incubated mixture of venom and the antiserum into the breast muscles, and discovered that it, like antidiphtheria serum, retains its specific power very much longer than has been supposed. The tests in every case were controlled. The following are the results of their experiments:—

Age of serum.	Number of samples.	Neutralizing power of 1 cc. of serum in 1 mgm. cobra venom.	Percentage loss of power during storage.	Percentage retention of power after storage.
2½ years	1	0.5	Nil.	100
3 years	2	0.2	60	40
3½ years	1	0.5	Nil.	100
4 years	1	0.3	40	60
7 years	4	0.5	Nil.	100
7½ years	3	0.5	Nil.	100
8 years	1	0.4	20	80
8½ years	4	0.28	45	55
9 years	2	0.35	30	70

The authors note the earlier discovery, by ANDERSON & CAIUS, of a loss of power in Kasauli antiserum in the course of six to eight months, and of an enhancement above its original power after twelve to fourteen months' storage.

Laboratory Observations and Experiments on Snake Venom.—CHOPRA & ISWARIAH⁶ state with regard to cobra (*Naja tripudians*) venom that the rise of blood-pressure is associated with stimulation of the vasomotor centre and is *not* due to acceleration of the heart; and they confirm the accepted opinion that the main action of the venom in lethal and sublethal doses is an initial stimulation and a final paralysis of the respiratory centre, *not* of the motor end-plates in the respiratory muscles. CHOPRA & CHOWHAN⁷ find, contrary to a statement that has been made, that cobra venom is fatal to several types of Protozoa.

⁵ MAITRA (G. C.) & AHUJA (M. L.). Potency of Time-Expired Antivenomous Serum stocked under Ordinary Conditions of Storage at the Central Research Institute, Kasauli.—*Indian J. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 155–158. [2 refs.] [Central Research Inst., Kasauli.]

⁶ CHOPRA (R. N.) & ISWARIAH (V.). An Experimental Investigation into the Action of the Venom of the Indian Cobra—*Naja naia vel tripudians*.—*Indian J. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1113–1125. With 3 graphs. [8 refs.] [School of Trop. Med. & Hyg., Calcutta.]

⁷ CHOPRA (R. N.) & CHOWHAN (J. S.). The Action of the Venom of the Indian Cobra (*N. naia vel tripudians*) on Certain Protozoa.—*Indian J. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1103–1111. With 2 coloured plates. [5 refs.] [School of Trop. Med. & Hyg., Calcutta.]

In strong solutions *Paramoecium caudatum* is at once paralyzed, sinks, swells, bursts, and disappears; even in solutions of 1 in 30,000 it kills *P. caudatum* by paralysis after exposure of 1 or 2 hours.

MALCOLM SMITH & HINDLE⁸ found the minimum lethal dose (for mice) of the venom of the pit-vipers *Trimeresurus sumatranus* and of *T. wagleri* to be 0.5 mgm. and 2.45 mgm. per kilo of body-weight, respectively; and of the seasnake *Laticauda colubrina* (captive and without food for at least 6 weeks) to be 0.113 mgm.; they doubt that the total yield of venom from any of these three species is sufficient to render the bite dangerous to healthy adult persons. Intense and extensive congestion (p.m.) characterized the bite of *T. sumatranus*; symptoms suggesting the existence of a neurotoxin that of *T. wagleri*. These same two authors tested the venom of an Australian Black Snake (*Pseudechis porphyriacus*) that had been collected and dried 39 years ago and kept ever since at room-temperature and not protected from light, and they found that its virulence was not perceptibly lessened.

GRASSET & ZOUTENDYK⁹ remarking on the well-known powers of resistance of certain reptiles, particularly snakes, to snake venom, give the bare results of some of their experiments on this subject, using lizards, chameleons, tortoises, and crocodiles and solutions of dried venom of *Bitis arictans* and of *Naja flava*. As an illustration of its interesting quality the following selection of facts may be quoted: The mortal dose in 24 hours being found to be of venom of *B. arictans* 0.2 mgm., and of venom of *N. flava* 0.08 mgm., per 100 gm. of guineapig, the crocodile was found to be about equally sensitive with the guineapig to both species of venom; the angulate tortoise to be 15 times more resistant to the viper venom but twice more sensitive to the cobra venom than the guineapig; and the zonurus lizard to be 30 times more resistant to the viper venom and 15 times more resistant to the cobra venom than the guineapig.

Serology, physiology, etc.—VELLARD & VIANNA¹⁰ discuss in great detail the effects on the living blood (of dog) of the venom of *Lachesis atrox*. They find that after subcutaneous or intramuscular injection there is an initial incoagulability due to rapid destruction of fibrinogen (and of complement) by the proteases of the venom; subsequently there is absence of formation of thrombin due to action of the venom on the hepatic cells, and haemolysins also are increased. The practical point here is that it is useless to use coagulant substances in treating the bite since fibrinogen is early destroyed. After intravenous injection there is at first intravenous clotting and then, in about five minutes the blood becomes incoagulable and the other events follow as above.

⁸ SMITH (Malcolm) & HINDLE (Edward). Experiments with the Venom of *Laticauda*, *Pseudechis* and *Trimeresurus* Species.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Aug. 8. Vol. 25. No. 2. pp. 115-120. [4 refs.] [Wellcome Bureau of Scientific Research, London.]

⁹ GRASSET (E.) & ZOUTENDYK (A.). Sur la susceptibilité des reptiles Sud-Africains aux venins de Viperidés et Colubridés. [On the Susceptibility of S. African Reptiles to Viperid and Colubrid Venom.]—*C. R. Soc. Biol.* 1931. July 16. Vol. 107. No. 23. pp. 1082-1083. [Inst. of Med. Research of S. Africa, Johannesburg.]

¹⁰ VELLARD (J.) & VIANNA (Miguelote). Modificações sanguíneas provocadas "in vivo" pelo veneno de *Lachesis atrox* (Linn.). [Modifications caused in the Blood in vivo by Venom of *Lachesis atrox* Linn.].—*Rev. Med. Cirurg. do Brasil.* 1931. May. Vol. 39. No. 5. pp. 143-169. With 14 graphs. French summary.

The same two authors¹¹ have also worked together on the action of snake-venoms on the complement. They show that venoms of certain Crotalines—*Crotalus*—have no action on the complement, while those of others—*Lachesis*, *Trimeresurus*—are anticomplimentary, and that of the Indian cobra has less and slower anticomplimentary action than the two latter; that a certain incubation-time precedes anticomplementary action; and that venom is not altered or modified in any of its activities by contact with the complement.

In his interesting Mathison Lectures KELLAWAY¹² adds to the evidence that active immunity against snake-venoms is often not so exclusively specific as was once supposed, the high resistance of animals immunized to one species of venom to other allied species of venom being due to the similarity of the venoms in toxic constitution and to the close serological relations of the snakes. These lectures should be read by those interested in immunity. This author thinks that the most important factor in the immunity of snakes to their own venoms is the high resistance of the tissues of the central nervous system, another factor being the presence of protective substances in the blood-plasma.

KELLAWAY & ELEANOR WILLIAMS¹³ working on the serological and blood affinities of some common Australian snakes find that the precipitin test in its simple form does not serve to differentiate closely-related Colubrid genera, but that complement-fixation carried out with precipitating antisera was not inferior to agglutination-reaction in its indication of specific as well as generic affinities. SEMBON¹⁴ has studied the blood-picture—agglutination, onset of coagulation, changes in size and shape of erythrocytes, erythrocyte resistance, and variations in reticulocytes—produced in the rabbit by venoms of *Trimeresurus gramineus* and *mucrosquamatus*, *Ancistrodon acutus*, *Naja atra*, and *Bungarus multicinctus*.

EIGENBERGER¹⁵ gives a general conspectus of the North American rattlesnakes, *Crotalus horridus*, *C. adamantus*, and *C. atrox*, and of their venom and its effects. He knows the effects as a patient, since he has been bitten by the first once, and twice by the second.

¹¹ VELLARD (J.) & VIANNA (M. Miguelote). Ação dos venenos ophidios sobre o complemento. [Action of Snake-Venoms on the Complement.]—*Arch. Brasileiros de Med.* 1931. Apr. & May. Vol. 21. Nos. 3 & 4. pp. 247–261; 295–305. [6 refs.] French summary.

¹² KELLAWAY (C. H.). The Mathison Lectures. Lecture I. Snake Venoms and Antitoxic Immunity. Lecture II. The Immunity of Australian Snakes to their Own Venoms.—*Med. Jl. Australia.* 1931. July 4 & 11. 18th Year. Vol. 2. Nos. 1 & 2. pp. 1–11. [30 refs.]; pp. 35–52. [27 refs.]

¹³ KELLAWAY (C. H.) & WILLIAMS (F. Eleanor). The Serological and Blood Relationships of Some Common Australian Snakes.—*Australian Jl. of Experim. Biol. & Med. Sci.* 1931. June 16. Vol. 8. No. 2. pp. 123–132. [12 refs.] [Walter & Eliza Hall Inst., Melbourne.]

¹⁴ SEMBON (S.). Ueber den Einfluss der Schlangengifte auf Blutbild, Widerstandsfähigkeit der Erythrozyten und Blutgerinnung des Kaninchens. [Effects of Snake-Venom on the Blood-Picture, Erythrocyte Resistance and Onset of Coagulation in the Guinea-pig.]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1931. Feb. Vol. 31. No. 2. (311). [In Japanese. German summary pp. 18–20.] [Govt. Inst. for Scientific Research, Formosa.]

¹⁵ EIGENBERGER (Fritz). Ueber das Gift der nordamerikanischen Klapperschlangen. [The Venom of North American Rattlesnakes.]—*Med. Klin.* 1931. June 19. Vol. 27. No. 25 (1384). pp. 922–925. ["Sheboygan Clinic," Sheboygan, Wis., U.S.A.]

OTTO¹⁶ has a rather academic paper on the possibility of estimating or authenticating the presence of neutralized snake-venom or snake-antitoxin in the blood by guineapig test (intracutaneous). He has had no incontestable success in many trials, but thinks that perhaps something may come.

A. Alcock.

¹⁶ OTTO (R.). Auswertung von Schlangengiftantiseren und Nachweis von Schlangengiftantitoxinen durch den Intrakutanversuch am Meerschweinchen. [Estimation of Snake-antiserum and Authentication of Snake-antitoxin by Intracutaneous Test in Guinea-pig.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 69. No. 5/6. pp. 368–378. [2 refs.] [Robert Koch Inst., Berlin.]

LABORATORY REPORTS.

KENYA, Colony and Protectorate of: **Medical Research Laboratory Annual Report 1929** [KAUNTZE (W. H.), Deputy Director of Laboratory Services].—*Kenya Med. Dept. Ann. Rep. 1929.* 30 pp.

The two items of outstanding importance during the year were the advisory visit of Colonel S. P. JAMES with regard to the control of malaria, and the beginning of the building of the new laboratory. A certain increase in the number of cases of human trypanosomiasis diagnosed in parts of S. Kavirondo was investigated; the infection is described as being comparatively non-virulent. Occasional plague outbreaks in certain areas have called for preventive inoculation. Pneumonia in Africans seems to be extraordinarily fatal, and a start has been made in classifying the local types of pneumococci isolated from patients that have died from this disease. Tuberculosis also is shown to be a very important morbid state; during the year "tuberculosis of practically every organ of the body except the pancreas" was discovered by the pathologist, leaving with him the impression "that tuberculosis in the native population approaches very closely to a septicaemia." A census of a local area that had undergone treatment for hookworm, 12 months before, showed an egg-count reduction of 50 per cent. Feeding experiments that have been in progress at the Reformatory and Prison are defined but are not yet reported. An undoubted case of rabies occurred in a dog; this and certain other scares has resulted in the equipment of an Antirabies Section of the laboratory.

Statistics of the routine work of the several departments follow in order—serology, antivariola-lymph and vaccination, pathology, bacteriology, medical zoology, biochemistry, and clinical pathology at the native hospitals of Mombasa and Nairobi—from which certain items of general interest may be noted. Among causes of death lobar pneumonia is a long way first. Malignant tumours in Africans number 51, sarcoma 21 and carcinomata 30. Leprosy bacilli were found in the nasal mucus of one of 9 suspected cases. Of Helminth infestation hookworm has precedence, and then in the following order *Taenia saginata*, whipworm, *Ascaris lumbricoides*, *Strongyloides stercoralis*, and *Schistosoma mansoni*. There has been an increase of *S. mansoni* infestation among European children around Nairobi, where the intermediation of a species of Planorbis has been discovered. The vastly predominant malaria parasite continues to be the sub-tertian. Infestation with *E. histolytica* is mentioned as being rare, and chiefly in European immigrants. Medical entomology has been concerned mainly with malaria mosquitoes and their identification and control, fleas and wild rodents in connexion with plague, and tsetse-flies in S. Kavirondo.

A list is given of papers published by members of the staff mainly in the *Kenya and East African Medical Journal* for 1929.

A. Alcock.

UGANDA PROTECTORATE. **Annual Report of the Laboratory Services Division (Medical Department) and of the Uganda Malaria Survey Unit, and Human Trypanosomiasis Research Institute, for the Year ended 31st December, 1930** [DUKE (H. Lyndhurst), MACLEOD (N. C.) and others.]-32 pp. With 4 graphs. 1931. Entebbe: Govt. Printer. [Shs. 2.]

In the routine laboratory work the obnoxious feature disclosed is the heavy incidence of malaria; at Kampala, of 1,009 blood examinations 401 were positive—*P. falciparum* in 184, *P. malariae* in 33, *P. vivax* in 16, mixture of species in 9, species not identified in 159: at the Mulago laboratory, of 7,752 examinations, 2,438 were positive—*falciparum* in 1,680, *malariae* in 213, *vivax* in 467, mixed species in 35, and unidentified in 43. In the faeces routine at Mulago of 4,577 stools examined by the Barber flotation method 2,971 contained eggs of worms, and of these 2,971 hookworm was present in 2,508, ascaris in 303, whipworm in 720, and tapeworm in 263. The Protozoa found in 463 stools examined are recorded as *E. histolytica* in 15 and flagellates in 42. At Kampala 44 tumours are recorded among the histology examinations, 14 being sarcomatous, 5 epithelioma, and 5 carcinoma.

The reports of the officers of the Uganda Malaria Survey state that the Survey in Kampala continued over 12 months. It showed that apart from natural swamps and river-valleys, the township abounds in a varied multitude of artificial and haphazard breeding-grounds prolific of Anopheles. The malaria is described as hyperendemic, and its morbidity as "appalling." Nearly 100 per cent. of native children under ten years are in a state of continuous infestation, usually without symptoms, and hence are regarded as the most sufficing local reservoir of infection. All three forms of the parasite are present, and analysis of the slides identified shows the specific prevalence to be for *P. falciparum* 51·4 per cent.; for *P. malariae* 42 per cent.; and for *P. vivax* 6·6 per cent. Of the six local species of Anopheles the only convicted carriers are *A. gambiae* (= *costalis*), *A. funestus*, and *A. theileri* (a new-reported carrier). All three intrude in houses, and of 16,357 females caught in the selected observation huts 50·7 per cent. were *gambiae*, 43·4 per cent. *funestus*, and 5·9 per cent. *theileri*—the last named being fairly common in one particular locality. All three breed in haphazard and artificial waters, *gambiae* preferring the open, *funestus* the shade, and *theileri* having a special predilection for wells and ditches.

The Malaria Survey in Jinja is recorded for 4 months during the dry season. Besides the marshes and swamps of the Nile and the lake shores, varied minor artificial excavations afford breeding accommodation for Anopheles. Of the six local species four were proved carriers, namely *A. gambiae*, *A. funestus*, *A. moucheti* (common some distance from the town), and *A. pharoensis* (not very common). The predominant house-haunter is *funestus*; other house-haunting species are *gambiae* (comparatively small numbers), *pharoensis* (in huts near their breeding-places), *moucheti* and *nili* (in huts near the Nile) and *mauritanus* (habitually; and commonly sated with human blood). Of 18,338 mosquitoes caught in houses 15,204 (83·1 per cent.) were Anopheles—59 per cent. of them being *funestus*, 27·4 per cent. *moucheti*, and 10·7 per cent. *gambiae*. Of all the carriers of malaria the species showing far the highest percentage of infection during each of the 4 months of the survey was *A. gambiae*.

In the course of a mosquito reconnaissance in the Bugishu area a

number of Anopheles (including *A. kingi* and *A. garnhami*) were taken on Mt. Elgon at heights of 6,000 and 7,000 ft.

In the Report of the Human Trypanosomiasis Institute the further continuation of studies on arsenic resistance in trypanosomes, and on the rôle of ruminants as reservoirs of *T. gambiense* is recorded. Among the other current researches those on the effect *in vitro* of human and other sera upon trypanosomes, and those on carbohydrate metabolism and nitrogenous renal excretion in cases of human trypanosomiasis are particularly mentioned, as well as various studies on superinfection, and on the factors that may influence the transmissibility of trypanosomes in man. As a notable event in the medical history of the Uganda Protectorate, the discovery of *T. rhodesiense* in man is recorded, the patient being a native from the Rogem area of the West Nile District.

A. A.

TANGANYIKA TERRITORY. Annual Report of the Medical Laboratory, Dar es Salaam for the Year ending 31st December 1929 [BURKE-GAFFNEY (H. J. O'D.), Assistant Bacteriologist, Acting Deputy Director of Laboratory Services].—52 pp. 1931. Dar es Salaam : Govt. Printer. [2s. 6d.]

The report of general routine work does not contain anything of extraordinary interest. It is stated that demands from out-stations for laboratory examinations, particularly serological and pathological, are steadily increasing. We may take note that among the pathological material from 124 individuals there were 24 malignant tumours from Africans.

The following six special investigations are reported: (1) On the virus of vaccinia, by Dr. CLEARKIN, which has been published in full elsewhere (see *Bulletin of Hygiene*, Vol. 5, p. 36). (2) On the therapeutic effect of antimony arsanilate as studied in animals infected with *Trypanosoma brucei*. The animals for experiment were chiefly Cercopithecus monkeys. Infection was usually preceded and followed by slight loss of weight, gradually increasing in unfavourable cases. The incubation period was 4 or 5 days, becoming less towards the end of the series of experiments. The drug suspended in olive oil was given by intramuscular injection, in doses of 0.75 to 3.0 grains; serious local effects occurred in only 4 cases and all of them small feeble animals. The interval between the first injection (0.75 to 3.0 grains according to weight) and the disappearance of trypanosomes from the blood was 5 or 6 hours in all cases except one which was a particularly heavy infection. The ultimate effects of treatment were much obscured by frequency of intercurrent disease (pneumonia); but even including these fatalities the average period of freedom in 21 monkeys after an average dose of 1.3 grains was 13 days. (3) A study of the value of the COOKE-PONDER polynuclear count in the diagnosis of tropical infections was too much limited and too incomplete to justify the drawing of conclusions, but the count appeared to be reliable in bacterial infections and repeated counts were valuable in prognosis and more reliable than a differential count. (4) Some experiments on the effect of standing after aeration upon the bacterial content of soda-waters point to the necessity of keeping these waters for several days, after aeration, before

consumption. (5) Comparisons of the Kahn with the Wassermann test elicit the opinion that although there is a certain want of agreement between the two the Kahn test is a valuable adjunct to the other because of its more persistent sensitiveness. (6) The results of a further bacteriological analysis of well water cannot be summarized to any good purpose, and are to be published elsewhere.

The report from the Vaccine Lymph Institute is descriptive. Clearkin's work is referred to above. That of the Analytical Chemist deals with routine. Appended Tables show the monthly figures for malaria and rainfall, for bacteria and animal parasites and their venue, for analyses of milk, and the sum total of routine examinations. The report as a whole is well arranged and well printed and is convenient and attractive in form and size.

A. A.

WALRAVENS (P.). Rapport annuel du laboratoire de bactériologie d'Elisabethville, année 1930. [**Report of the Bacteriological Laboratory, Elisabethville, 1930.**—*Ann. Soc. Belge de Méd. Trop.* 1931. Mar. 31. Vol. 11. No. 1. pp. 101–126. With 3 charts.

Sleeping sickness seems to be “in notable regression”; it exists only in places where the natives repair to the river daily; treatment by simple tartar-emetic has been tried and found wanting. Preventive B.C.G. vaccination against tuberculosis has been done on 155 infants without any untoward effect except for 6 cases of cold abscess; in the course of the year 8 vaccinated children died, but p.m. examination produced no evidence of tubercle infection in any. Of 1,515 Bordet-Wassermann tests 360 were positive; mental symptoms were observed in 13 cases, but no tabes. There was a serious increase in typhoid fevers. Of 71 examinations of nasal mucus, etc., 11 disclosed the leprosy bacillus. Of 1,557 European blood smears 299, and of 1,230 adult African 168 showed malaria parasites, while 90 to 100 per cent. of African children were infected. In 32 lumbar punctures 23 revealed meningococcus or pneumococcus; the value of indiscriminate preventive vaccination in epidemics of this form of meningitis is endorsed, although the immunity imparted is not long-enduring. Of 417 faecal examinations *ad hoc* 160 showed intestinal parasites—hookworm in 127, *Strongyloides* in 25, *Ascaris* in 2, *Schistosoma mansoni* in 14, tapeworm in 2, “amoeba” and *Balantidium coli* each in 1 case. Among the bacillary dysenteries the following bacilli have been identified—Shiga, Flexner, Hiss, Strong, Castellani, metadysenteric, proteus and coli. Purulent and bacillary affections of the urinary tract are much prevalent in Katanga; one (European) case of infestation by a nematode worm is noticed, the symptoms were acute renal pain with passage of slightly purulent and sanguinolent urine and on one occasion empty egg-shells and (twice) a larva. About 30 per cent. of a body of African students were passing eggs of *Schistosoma haematobium* in the urine, and one African passed eggs of *S. bovis*. *Physopsis africana* and a species of *Planorbis* are the local intermediaries. A few cases of rabies in Europeans have occurred at Kivu. Particulars are given of the native school for hospital assistants and sanitary inspectors.

A. A.

BRAZZAVILLE. Rapport sur le fonctionnement de l'Institut Pasteur de Brazzaville pendant l'année 1930 [VAUCEL (M.)]. [**Work of the Brazzaville Pasteur Institute in 1930.**].—76 pp. 1931. Brazzaville: Imprimerie du Gouvernement Général de l'Afrique Equatoriale Française.

This report is strait-laced with official rigour. Of its 74 pages 45 are devoted to trypanosomiasis, much of it in statistical garb. In other directions we learn that the only malaria parasites observed were *P. vivax* and *P. falciparum*; of *vivax* nothing but young schizonts, of crescents only one case. Of Filaria, always *F. perstans* and harmless. Of intestinal parasites, the dysentery amoeba and its cysts, and *E. coli*; Trichomonas; *Balantidium coli*; *Schistosoma mansoni*; ascaris, hookworm, whipworm, and strongyloides. In 112 coprocultures 76 per cent. were positive for bacilli—44.1 per cent. of these for the Shiga bacillus, 55.9 per cent. for non-toxic organisms; of 39 Shiga cases 12 were mortal. For immunization of travellers formalized dysentery toxin (anatoxin of Dumas) was used. Tuberculosis in native children is far from rare, and preliminary experiments proved the infants to be quite tolerant of B.C.G. vaccine. Three new strains of Pneumococcus were isolated. The leprosy bacillus was found in 2 of fourteen examinations. The classical hard primary sore is a clinical rarity in syphilis—"mixed" chancres are the usual phenomenon.

Of trypanosomiasis 258 new, 674 old, and 92 suspected cases were treated during the year and 30 deaths are recorded. To give statistics of the varied treatments employed at different stages and of the results observed would necessitate the reproduction of 20 pages of the report. The drugs used were tryparsamide, 270 Fourneau, atoxyl, various arsenicals, tartar emetic, moranyl, and bismuth, separately or in combinations.

A. A.

GOLD COAST. Annual Report of the Medical Research Institute and its Branch Laboratories [BUTLER (G. G.), Director].—*Gold Coast Rep. on Med. & San. Dept. for Year 1929-1930*. IX. Scientific. pp. 71-166. With 18 figs. on 7 plates, 15 charts & 3 maps.

The report begins with the work of the routine departments (12 pp.), continues with reports (75 pp.) of special investigations—relapsing fever, plague, malaria, trypanosomiasis, medical entomology, schistosomiasis, etc.—and ends with some tables of statistics (4 pp.).

Of more than 5,000 routine blood-examinations, 28 per cent. showed malaria and well over 90 per cent. of these *P. falciparum*, carriers much outnumbering sufferers, since a high immunity to the disease exists in the Gold Coast. Only one case of blackwater fever occurred, in a young Swiss subject, whose death occurred within 48 hours of attack, the post-mortem examination, made within 3 hours of death, being fully reported here.

Of 62 cases of genital infection with gonococcus 13 occurred in children of 15 years and under, including ten young girls with an average age under 7 years.

The existence of enteric fevers is well corroborated. Of dysenterics 46 cases were bacillary (mostly Flexner), 43 amoebic, and 9 due to *Schistosoma mansoni*. Of relapsing fever, 25 cases were diagnosed. In about 100 routine serological examinations no evidence of the

existence of typhus was obtained. The tubercle bacillus was found in 232 of 512 sputa from cases selected as suspicious, and in 26 post-mortem examinations. Yellow fever was not encountered, but the post-mortem observations in 2 ambiguous cases labelled toxic jaundice are recorded. Among histological examinations 31 malignant tumours were observed—17 sarcomatous and 14 carcinomatous.

About 12 per cent of stools show ova of hookworm, chiefly *Necator*. *Schistosoma haematobium* was present in 87 urines. It is thought that about 10 per cent. of the population served by the general hospital at Accra are sufferers from schistosomiasis.

Since a small outbreak of relapsing fever in Accra cases have occurred steadily, and the autopsies of eight are here recorded to illustrate the difficulties in clinical diagnosis from toxic jaundice. Spirochaetes were found in the lice of 11 of 18 cases examined. The Wassermann reaction was found to be of no value in diagnosis. The disease was also studied experimentally in pouched rats (*Cricetomys*) and in desplenated white rats. The most constant lesion in the former is enlargement of the spleen. The serum of a rat recovered from an infection with any type of spirochaete contains something that disintegrates and destroys that particular type of spirochaete, and there is some evidence of the development also of a *general* resistance besides this *particular* spirolysin. Desplenated rats suffer more severely from infection, but removal of the spleen does not prevent the development of immunity.

Of 4,433 rodents examined for plague, not one was found infected. A summary of the last instalment of Dr. BURGESS's experimental work on plague is given here, but the work will be published *in continuo* in the *Journal of Hygiene* [this *Bulletin*, Vol. 28, p. 389]. The pouched rat (*Cricetomys gambianus*) is described as a very suitable animal for plague experiment on account of its easiness to keep and its extreme susceptibility.

In a study of malaria in parturient mothers 328 placentas, with in each case a film of maternal finger-blood, showed 53 with parasites in both, and 23 in the placenta only—sometimes in "amazing" number. Further statistics show that active malaria of the placenta seems to be an important cause of premature labour, but not to affect the health of the infant. Placenta extracts have been employed in the search for a precipitin test for malaria, but without any confirmed success.

From study of the Bordet-Wassermann reaction in mother and infant and of a large number of placentas only about one tenth of the 30 per cent. of the cases giving the reaction seemed to be traceable to syphilis, and there seemed to be no evidence that yaws causes any gross changes in the placenta.

Of human trypanosomiasis 34 cases were diagnosed and 26 of them came for treatment (atoxyl, Bayer 205, and tryparsamide). Much experimental work in establishing strains of trypanosomes in animals is described, and the adhesion phenomenon is discussed.

The Veterinary interests being considered for the moment as more pressing than the human aspects of trypanosomiasis, entomological work has been concentrated on clearing the main cattle-route, from the French territory on the Haute Volta to Kumasi, of *Glossina palpalis* and *G. tachinoides*. On the eastern route "clearing has undoubtedly succeeded in controlling" these species, followed by burning, and in addition "motor transport and the gradual elimination of wild game is undoubtedly diminishing and restricting the distribution of the

G. morsitans group." The clearing of streams in the lower portion of the coast plains of the Eastern Province is said to be easy, but in the northern portion "the vegetation appears to be too extensive to warrant the expenditure at present." The little egret and various species of bee-eaters (*Merops*) have been seen hawking the fly as it flees from the burning bush. Observations in the laboratory showed the gestation of *G. palpalis* to range between 6 and 17 days. In the fly-belts crossing the northern part of the eastern cattle route, clearing and burning have been carried on also. Here there is much big game and *G. submorsitans* is an important species. This part of the report is very full of detail on the bionomy of the flies and with local details on the effects of clearing, burning in the early part of the dry season, maintenance of clearing, etc., and is illustrated with numerous plans and charts and some beautiful photographs.

The preliminaries of an investigation of local pondsnails in search of intermediary hosts of *Schistosoma* are sketched.

A. A.

MAURITIUS. Annual Report of the Bacteriological Laboratory for the Year 1929 [BARBEAU (L. G.), Supt.].—Appendix I. 8 pp.

In the active routine of this laboratory the discovery of eggs of *Clonorchis sinensis* in the faeces of fifteen Chinamen and the number of urines found to contain eggs of *Schistosoma haematobium* led to the starting of one interesting investigation and the stimulation of another.

In the case of the *Clonorchis* infection it was found to exist in some instances in Chinamen who had lived in the colony without interruption for over 30 years—a fact that suggested either that some local intermediary hosts of *C. sinensis* were present in the colony or that the parasite in man was amazingly long-lived. Careful investigations showed that active miracidia did not hatch-out in water, although occasionally an inert miracidium was partly extruded from an egg; that four local species of pondsnails known to harbour cercariae of some kind did not become infected with the cercaria of *C. sinensis* when exposed to infection in water containing faeces full of the eggs of that species; and that 2 species (goldfish and top-minnows) of fresh-water fishes did not become infected with the metacercaria of *C. sinensis* when living in water containing teased livers full of cercariae from the Mauritius pondsnails. Thus no clue was found in the search of the Mauritius aquatic fauna for an intermediary host of *Clonorchis sinensis*.

In the case of the *Schistosoma haematobium* infection the search for a local intermediary host among the pondsnails (already described in this *Bulletin*, Vol. 27, p. 944) was continued, but is still an enigma.

Among histopathological observations 7 cases of epithelioma, 8 of carcinoma, and 6 of sarcoma are mentioned. Shrivelled eggs of *S. haematobium* were found in 3 epitheliomata.

The results of B.C.G. vaccination of infants are interesting in their suggestions. For all the 21,591 children born in the colony during the 18 months ending with September 1929, the death-rate from all causes was 13.12 per cent. For 1,660 of these children whose history is known subsequent to their B.C.G. vaccination the death-rate from all causes was 5.54 per cent.

A. A.

ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS. 1931. Apr. Vol. 20. No. 1. pp. 101-121.—Fonctionnement des services de l'Institut Pasteur pendant l'année 1930. [**Work of the Pasteur Institute, Tunis, 1930.**]

This is a record of a full and comprehensive routine; the original work accomplished is referred to the Journals wherein it has been published.

A full and very particular account is given of the antirabic service. During the year 1,812 persons attended for treatment and 1,345 were actually treated, 365 having the intensive treatment for bites of unusual severity. Of the 1,345 treated 1,075 were Tunisians. There were 5 deaths subsequent to completion of treatment, 3 being persons bitten by the same dog. (Intelligence was received of 3 deaths from rabies in Tunis of persons who had not come for treatment, also of the death from rabies in 1930 of a person who had undergone treatment in 1929). The sources of infection were dogs in 1,162 cases, cats in 104, rabid human beings in 28, asses and horses in 24, cattle and camels in 14, rats and mice in 8, and fox, monkey, rabbit, and weasel in one case each. The number of cases of rabies treated since the foundation of the Institute in 1906 to the present time is 19,431 with a mortality of 0.37 per cent.

During the year of this report, 1,058,346 doses of Jennerian vaccine prepared at the Institute were distributed.

In 323 analyses of dysenteric stools *Entamoeba histolytica* (or cysts) was observed in 31, *E. coli* (or cysts) in 8, *Trichomonas* in 23, *Lambliia* (or cysts) in 32, tapeworm eggs once; the Flexner bacillus in 7. In 22 spleen-punctures *Leishmania donovani* in 6 cases; and malaria parasites in 143 of 684 smears.

Of the children submitted to antituberculous (B.C.G.) vaccination during 19½ months the history of 141 has been followed. Twenty-one of them, so far, are dead, and in each case a brief statement is given of the antecedent conditions and (where known) the cause of death; among the 120 still living, many of them in contact with infected relatives, not a single unquestioned case of infection has occurred—particulars of each are given in brief.

A. A.

i. SERGENT (Edmond). Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie. [**Report on the Work of the Algerian Pasteur Institute.**]—*Arch. Inst. Pasteur d'Algérie*. 1930. Mar. Vol. 8. No. 1. pp. 116-148. [51 refs.]

ii. —. *Ibid.* 1931. Mar. Vol. 9. No. 1. pp. 141-174. With 1 plate & 1 chart. [37 refs.]

i. The research report opens with an appropriate appreciation of LAVERAN'S memorable discovery and a retrospect of the tale of original work completed and published during the year 1929. This work includes a critical account of the value of fish against mosquitoes and a laborious examination of the basis of the facile theory of the zootropism of *Anopheles maculipennis*; much investigation of dermal and canine leishmaniasis; an inquiry on the Gram reaction and its specific limits; a report on results of B.C.G. vaccination of 3,598 children; an inquiry on the frequency and nature of the ringworms of the indigenous population; work on antirabic vaccination of dogs; and miscellaneous studies

in bird-malaria, parasitology, and entomology ; besides varied research in veterinary pathology and practice which does not come within the purview of this section.

From the service report we learn that 2,229 individuals were treated for rabies in 1929 of whom 25 did not complete treatment, and 0.2 per cent. died ; the animals answerable were dog, 1,112 ; cat, 108 ; rat, 21 ; ass, 14 ; cattle, 6 ; rabbit, 3 ; mule, 2 ; and fox, pig, sheep, goat, 1 each—besides 5 infections from rabid patients and 2 from laboratory accidents. Against malaria varied antilarval methods have been pursued extensively—oil, larvicide powders, draining and filling-in, training, clearing away of vegetation, double-channeling with alternating flow, distribution of fish. The quarters of railway officials in malarious tracts have been gauze-screened. Quinine (and other analogous medicines) has been regularly distributed by official quininers among the householders and school-children to the number of about 20,000. Several malaria surveys have been made, and instruction in prophylactic methods against malaria has been widely disseminated. Of serums, vaccines, and similar laboratory products exclusively for medical use 1,417,611 units have been issued during the year.

ii. The introduction reminds us that the scope of the Pasteur Institute of Algiers includes not only human, but also veterinary and agricultural pathology, also special instruction in pathology and in laboratory methods for colonial medical officers, and the education of the public—in short, all that bears upon the common welfare of the colony, and the physical well-being of the population. Here we confine attention mainly to matters of medical interest.

In 1930 the Institute was called upon to organize the second International Malaria Congress, and at the same time had the honour of commemorating the fiftieth anniversary of LAVERAN's discovery of the malaria parasite, in the very hospital in Constantine where this ever-memorable discovery was made. At the village Laveran, in a certain propinquity to the imposing relics of Ancient Roman grandeur at Timgad, a modest monument to the great Frenchman was unveiled.

Among matters of research the following are noteworthy. (1) As an experiment with plasmoquine as a pivotal prophylactic of malaria 9 infected native children were kept on it for 45 days, but all were still carriers of the parasite at the end of that term. (2) Experiments *ad hoc* have shown that the parasite of Mediterranean leishmaniasis propagates in *Phlebotomus perniciosus*. (3) The work of PLANTUREUX on bacteriolysis, and his experiment describing the appearance of a bacteriolysate when a culture medium of dysentery bacilli is alkalinized is briefly summarized. (4) The local ringworms and their distribution have been studied by CATANEI ; in certain localities those of natives and those of the local Europeans are found to be not due to the same fungus. (5) Experiments with animals that have become resistant to infection after clinical cure from a specific piroplasmiasis show that this resistance is abrogated by splenectomy ; hence the spleen is to be regarded as "the main organ of premunition" against these infections. As research also must be included various expeditions to the Algerian Sahara to study the people and their customs and their diseases and medicine, the fauna and the parasites, and certain elements of the flora.

In 1930 the number of cases of rabies that applied for treatment was 3,936, of which 136 were certified experimentally and 1,569 clinically, and 2,231 were bites from animals suspected of rabies. Of 3,893

persons that completed treatment 5 died—4 of them more than fifteen days after conclusion of treatment. One case of neuritic complications occurred a day after conclusion of treatment, but was cured rapidly and completely. The bites were inflicted by dogs in 1,788 instances, cats in 276, equines in 15, bovines in 11, rabbits in 9, rats in 39, and jackal, fox, ferret in 5 instances. For preventive vaccination of domestic animals, enough formolized antirabic vaccine for about 2,500 dogs and a certain number of herbivora was supplied to the veterinary establishment.

The Antimalaria Service was relieved of the executive duties that it has carried on for so many years, in order to concentrate more particularly on the science of malariology.

Among the activities mentioned in a general way as having made comforting progress during the year, are treatment of infantile gastroenteritis by massive doses of fresh cultures of lactic ferments; B.C.G. vaccination of newborn infants; "premunition" of bovines against piroplasmoses; experimental vaccination against aphthous fever by the method of VALLÉE, CARRÉ and RINJARD; extension of serotherapy against porcine plague; and the preparation of the new antirabic vaccine for immunizing dogs.

A. A.

BOMBAY. Report of the Haffkine Institute for the Year 1929
[ANDERSON (L. A. P.), Offg. Director].—69 pp. 1931. Bombay: Govt. Central Press.

Much interesting matter is contained in the annual reports of the large tropical laboratories. Most of it, no doubt, comes finally to special journals, but there are details of management and of technique which have a special call upon the attention and which are not always available in the ordinary publications.

The investigation of plague has always been the chief field for research of the Bombay laboratory. The large scale manufacture of plague vaccine has raised its own problems of preparation and distribution. How long might the vaccine be held to retain its potency and was it possible to shorten the process of manufacture so as to diminish the minimum notice required for compliance with unforeseen demands? Could agar vaccine effectively replace broth vaccine and could the reaction resulting from inoculation be lessened? These are not new problems but it is interesting to find that, as a result of the discussions of the International Plague Committee, categorical answers have been given to these questions. The Bombay broth plague vaccine may continue to be used up to 18 months from the date of manufacture and up to two years if kept in cold storage. One disadvantage of the broth vaccine was the long time taken in manufacture, but it has been found that this can be cut down from 12 weeks to 6 weeks without loss of efficiency. Another of the conclusions of the Committee was that, on the large bulk of experimental and other evidence which has accumulated, the substitution of agar vaccines for the present broth vaccine is not practicable. Plague vaccine is, unfortunately for its popularity, productive of a severe reaction and it is not thought that this can be reduced very much beyond that which follows length of storage. A very interesting research into the standardization of anti-plague vaccine, which relates both to the preparation of a fixed seed

virus and to the assessment of potency after manufacture, is referred to in some detail under the heading Anti plague Enquiry.

Tuberculosis, while not a specially tropical disease, is one of great importance in the East as in the West. Experiments on rabbits indicated that the well known BCG vaccine may exceptionally prove virulent and produce fatal tuberculosis whilst other experiments on the same animals by the Bombay workers seemed to show that prophylactic inoculation in their hands "afforded meagre protection evidenced only by prolongation of life in vaccinated animals subsequently infected with the smallest dose of virulent organism."

In the last annual report reference was made to the establishment of normal physiological standards for Indians. It has been determined that red cell counts in millions per cmm., haemoglobin in gm. per 100 cc. and volume of cells in cc. per 100 cc. were for men 5.11, 15.36 and 41.72 and for women 4.47, 12.99 and 36.27 respectively.

In the anaemia enquiry it was found that the administration of liver preparations had become so general that fully developed cases of pernicious anaemia, sprue and the severe anaemia of pregnancy were difficult to find. A reaffirmation of the statement, contained in the previous report, is made that "the resemblances between these conditions are more striking than the differences except perhaps as regards the presence or absence of free hydrochloric acid in the gastric contents." The report as a whole provides extremely interesting reading and indicates generally what a large field for experimental enquiry India affords to laboratory workers.

W. F. Harvey.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. 1931. Aug. 15. Vol. 71. No. 10. pp. 928-951. [5 refs.] Uit het Jaarverslag van het Geneeskundig Laboratorium over 1930. [From the Annual Report of the Medical Laboratory for 1930.]

This report contains much information about the activities of the laboratory. Some points of general interest may be mentioned.

Bacteriological Department.—On MÜLLER'S tetrathionate medium *Bact. typhosum* is often overgrown by *Proteus vulgaris*. *Bact. paratyphosum* A and *Bact. dysenteriae* do not grow on it. For these reasons it is (when used exclusively) unsuitable for laboratory practice in the tropics.

B. meningitidis Cohen was found twice. It proved to be pathogenic for monkeys (*M. cynomolgus*) who died after intracerebral infection with small doses, showing little meningeal but mostly septic symptoms. By the pharyngeal way infection experiments did not succeed. Rabbits were altogether immune.

For cultivation of the tubercle bacillus Petrof's medium was found superior to that of Löwenstein-Hohn.

Pf. whitmori was found in the body of a rat; in connexion therewith a possible human case of melioidosis is briefly mentioned. In 34 tests the Weil-Felix reaction was 8 times positive with the indologous strain, contrary to experience in the F.M.S., where Kingsbury's anindologous strain gives more positive results.

Malaria Department.—The important experiments in hygienic (i.e., Anopheles free) exploitation of fish ponds, already published, are briefly quoted. In the hill country where *A. maculatus* and *aconitus* are the dangerous vectors planting of shadow trees over little streams

and in ravines is suggested, since larvae of the incriminated species are never found in the jungle. In fresh water fish ponds the *Puntius javanicus* proved to be a useful larva destroyer. The entomological research mentioned is, or will be, published elsewhere.

Chemical Department.—The report deals with further attempts to standardize the strength of Vitamin B tablets issued by the Laboratory. Preparations suitable for injection could be rendered completely free from toxic substances. In serious cases of beriberi with impaired absorption from the intestine such preparations may prove useful; it should be kept in mind that daily doses are required. A definite judgment about the preparation is not yet available. A number of foodstuffs were tested chemically, and in regard to their content of vitamin A; various fish products proved negative in this respect, a brand of sweetened condensed milk positive. Difficulties were experienced in vitamin C research; the guineapigs could only gradually be accustomed to the basic diet.

Quantitative iodine tests on urine were made which will be published later.

W. J. Bais.

CLÉMENT. Fonctionnement du laboratoire de clinique de l'hôpital du Camp-Jacob de 1927 à 1930. [**Work of the Clinical Laboratory at Camp Jacob, Guadeloupe.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. Oct.-Nov.-Dec. Vol. 28. No. 4. pp. 609-611.

This short report concentrates on intestinal parasites. Of 1928 stools examined 1,649 (85.5 per cent.) contained evidence of them, the following species being represented—*Necator americanus*, 27.8 per cent.; *Ascaris lumbricoides*, 56.2; *Trichuris trichiura*, 62.7; *Schistosoma mansoni*, 20.3; *Strongyloides stercoralis*, 9.7; dysentery amoeba, 10.2; *Balantidium coli*, 0.4; flagellates, 6.0; several specimens of *Taenia saginata* were passed; eggs of thread worm were observed very often, though never found in the stools examined: a food-mite (*Tyroglyphus*) was found several times. A boy of 10 years, not infected with malaria parasites, but having an eosinophilia of 43 per cent. and many eggs of *Schistosoma mansoni* in his stools, on several occasions suffered from a violent rigor followed by a spell of high fever. A fatal case of balantidium dysentery occurred.

In 394 blood examinations *Plasmodium vivax* was found in 71, "*P. praecox*" in 51, and *P. malariae* in 4; and divers microfilariae in 8. In 83 examinations of sputa the tubercle bacillus was found in 22, spirilla in 4, amoebae in 4, and fungi in 1. In 9 examinations of nasal mucus the leprosy bacillus occurred in 4. In 40 examinations of chancre-juice *Treponema pallidum* was present in 5.

A. A.

KOPPISCH (Enrique). **Report of the Pathology Department of the School of Tropical Medicine for the Period beginning April 15, 1929 and ending June 30, 1930.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Mar. Vol. 6. No. 3. pp. 334-340. [School of Trop. Med., Univ. of Porto Rico, San Juan.]

The report tells of a great increase in the number of autopsies, and of pathological specimens received from outside sources including the

neighbouring islands of Santo Domingo and St. Thomas. The incidence of tumours seems to be no different from that in countries outside the tropics; among the 1,360 miscellaneous specimens there were 347 tumours, of which 207 were malignant. The intestinal worms observed are hookworm, whipworm, *Ascaris*, *Strongyloides*, and *Schistosoma mansoni*. One case of splenomegaly was apparently caused by *S. mansoni*. Besides schistosomiasis the other tropical diseases in evidence were malaria, filariasis, sprue, and leprosy, and climatic bubo is stated to be not at all uncommon in the island. Of diseases of more general distribution lobar pneumonia was fatal in 11 cases, and lobular pneumonia in 7, and typhoid fever in 6; pulmonary tuberculosis both chronic and acute is also mentioned.

A. A.

RABIES.

A REVIEW OF RECENT ARTICLES. XVI.*

An occurrence of extraordinary interest is reported^{1, 2} from Trinidad, an island in which the strictest quarantine laws against rabies are in force, and in which no case of rabies has been recognized since 1914. Cases among the human population simulating acute poliomyelitis made their appearance in 1929, and possibly earlier, mainly in children of school age. Of 20, which have occurred during the present year (1931), all have terminated fatally. Since 1925 a fatal disease diagnosed as botulism, and characterized by symptoms referable to lesions in the brain and cord has been present as an epizootic amongst cattle. The features of the human cases may be summarized as follows. The symptoms were those of paresis of limbs, bowels and bladder, loss of sensation in the limbs and abdomen. In the later stages only, the muscles of respiration and deglutition became involved. A fatal termination after an average of 8.5 days ensued. The paresis followed an ascending course. Portions of brain were submitted to HURST at the Lister Institute, London. Inoculation into monkeys induced symptoms suggestive of rabies. Subsequent subpassage through monkeys and rabbits led to the establishment of a virus which gave symptoms indistinguishable from the fixed virus of rabies. Negri bodies with "innenkörperchen" were present in the monkeys without exception, and in some of the rabbits. Similar results were obtained at the Rockefeller Institute from material supplied.

The features of the cattle disease were salivation, paresis of the legs, and a fatal termination after 5 or 6 days. A brain was sent to HURST, who reported the presence of rabies virus. PAWAN working at Trinidad found Negri bodies in one of three monkeys into which suspected material was injected. The diagnosis of botulism had been based on the clinical features of the cases and on the detection of the bacillus in the soil from the Savannah and the Government farm where cases had occurred. In two cows the bacillus was recovered from the liver and the spleen. "It appears," according to HURST and PAWAN "either that botulism and rabies exist side by side and are clinically indistinguishable or, more likely, that the cattle disease is rabies, and the finding of *B. botulinus* a chance occurrence unconnected with the real cause of death. Further investigation of this problem is proceeding as are cross immunity tests with the cattle virus and fixed virus." The latter authors discuss the unusual clinical features of the human cases, and suggest, "the possibility of a modification of the virus of rabies in a manner analogous to that of the smallpox virus in alastrim, or in an opposite direction." They found no indication from their experimental results that the Trinidad virus is either more or less virulent than the average street virus.

The epidemiological features of the human and cattle diseases, both of which may be accepted as rabies, are of peculiar interest. There

* For the fifteenth of this series see Vol. 28, pp. 741-753.

¹ TRINIDAD AND TOBAGO. Council Paper No. 85 of 1931. Myelitis. Report on the Cases of Acute Ascending Transverse Myelitis which occurred in the Southern Part of Trinidad since 1929 [LASSALLE (C. F.).]—8 pp. With 2 folding maps. 1931. Trinidad. [1s. 4d.]

² HURST (E. Weston) & PAWAN (J. L.). An Outbreak of Rabies in Trinidad without History of Bites, and with the Symptoms of Acute Ascending Myelitis.—*Lancet*. 1931. Sept. 19. pp. 622-628. [51 refs.]

appears to be no geographical relationship between them. The only case in which there was history of a bite occurred on July 6th, 1931, and that was the bite of a bat. Symptoms developed on August 3rd, i.e., after 28 days. Thus 17 human beings, if they were bitten at all, were bitten without their knowledge. Reference is then made by HURST and PAWAN to an enzootic in Brazil (HAUPT and REHAAG. *Ztschr. f. Infekt. u. Hyg. d. Haust.*, 1921, Vol. 22, pp. 76, 104) in which cattle bitten by vampire bats developed rabies, and "in which the experimental investigation of a bat caught biting a cow confirmed the supposition that these creatures were the vectors." The opinion that the vector in the human and cattle cases in Trinidad, "may be the vampire bat is tentatively expressed." A typed addendum to the Trinidad Council Paper dated October 3rd, 1931, states that "Dr. PAWAN has now demonstrated Negri bodies in the brain of a bat with unusual habits."

A severe epizootic of rabies at Kindia (French Guinea), is reported by DELORME³. During a period of 2 months 26 persons were bitten, the biting animals being 6 dogs and 1 cat, and in addition many mad dogs were destroyed in the neighbourhood. The brains of the seven biting animals were examined, and submitted to animal test with positive results. Prior to 1927 rabies was considered to be of rare occurrence in Guinea. The marked increase which has been noted since that date is, in the author's opinion, due to the number of dogs which have been imported from Europe.

The rabies situation in Los Angeles County is causing considerable concern to the health officials. In reply to a request by the Editor of *California and Western Medicine*, MEYER⁴ discusses the various methods for the control of rabies, and in a letter (page 69 of the same Journal), the County Health Officer, J. L. POMEROY, gives statistics relating to the prevalence of the disease. It appears that during the year 1930, 1,720 persons have been bitten, of whom 361 received pasteurian treatment, and that 613 rabid dogs were reported. No mention is made of fatal cases.

i. *Virus.*

Mention has frequently been made in previous reviews of epizootics in South America amongst cattle and horses, in which the symptoms were probably those of rabies. REMLINGER and BAILLY have discussed certain of these (this *Bulletin*, Vol. 28, p. 741) and have concurred in the view of the Brazilian authorities that the viruses concerned were those of rabies. TORRES⁵ has applied the complement test to a number of such viruses. Antigens were prepared with the viruses of Santa Catherina, Matto Grosso (*loc. cit.*, Vol. 27, p. 262), Etat de Rio, Bahia, Espirito Santo, the Federal district, fixed virus, and normal brain substance. Sera were obtained from animals inoculated with street virus, virus of Santa Catherina, fixed virus, and from a normal animal. The method employed was that of KRAUS, TAKAKI, and MICHALKA (*loc. cit.*, Vol. 24, p. 224). The results are given in detail and show

³ DELORME. Note sur une épizootie de rage observée à Kindia (Guinée française).—*Bull. Acad. Méd.* 1931. July 28. Year 95. 3rd Ser. Vol. 106. No. 28. pp. 103-106. [1 ref.]

⁴ MEYER (Karl F.). Rabies.—*California & Western Med.* 1931. July. Vol. 35. No. 1. pp. 39-40.

⁵ TORRES (Sylvio). A raiva no Brasil. Seu diagnostico pela fixação da alexina.—*Rev. Zootechnia e Vet.* 1931. Vol. 17. No. 2. pp. 148-157. [7 refs.] French summary.

that the various Brazilian viruses are identical with the fixed virus of PASTEUR. Also it was shown that the sera of rabbits inoculated with fixed virus neutralized the virus of Santa Catherina and *vice versa*.

Another South American virus has been examined by REMLINGER and BAILLY⁶. It was obtained by ROSENBUSCH from cattle during an epizootic of mal de caderas in Paraguay in 1930 (*C.R. d. l'Acad. des Sciences*, Nov. 1930). The mortality was low (20–60 per cent.) and it was stated that no Negri bodies could be found. REMLINGER and BAILLY state that when subpassaged in the rabbit the symptoms do not differ from those of rabies. The disease can also be transmitted to the guineapig, the mouse, the cat, the sheep, and the dog, the symptoms being invariably paralytic in type. Pruritus, which is the predominant symptom in infective bulbar paralysis (the pseudo-rabies of AUJESZKY), has never been observed. Negri bodies were found in the various animals inoculated. The behaviour of the virus to glycerine and ether and in dilution is similar to that of other rabies viruses. Thus the only objection to placing this virus amongst the viruses of rabies is that in cattle the disease to which it gives rise is not invariably fatal. In the case of experimentally inoculated animals, however, the authors have never witnessed a recovery. The authors believe that the virus is identical with that of rabies. ROSENBUSCH they say is at present carrying out cross immunity tests at Buenos Aires.

A close experimental study of the virus of "mad itch," a rare disease of cattle in America, is made by SHOPE⁷. The disease in its clinical features closely resembles the pseudo-rabies of AUJESZKY. Both are characterized by pruritus, and in both the animals become progressively weaker and die. The incubation periods and periods of sickness are the same. The post-mortem findings are identical. In pseudo-rabies the virus can be demonstrated in the brain and other organs, in mad itch it is localized largely in the region of inoculation and in the lung. Both are filter passers. Pseudo-rabies virus is neutralized by anti-"mad itch" sera. The author arrives at the tentative conclusion that the inciting agents of both diseases are the same, although the strains of the two viruses under study possess readily demonstrable differences.

It will be remembered that CUNNINGHAM, NICOLAS, and LAHIRI found that the Kasauli strain of fixed virus was less resistant to ether than the Paris strain (this *Bulletin*, Vol. 27, p. 746). REMLINGER, PALMOWITCH and BAILLY⁸ have compared the resistances of strains of virus. The fixed virus of Tangier resisted submersion for 120 hours; three other strains of fixed virus from European institutes were alive after 120, 168, and 144 hours. The reinforced street virus of Chisinau and the virus of mal de caderas of cattle in Paraguay (virus Rosenbusch) resisted immersion for 120 hours. The authors stress with CUNNINGHAM and his co-workers the necessity of determining the resistance of the strain of fixed virus employed, before using etherized vaccines.

⁶ REMLINGER (P.) & BAILLY (J.). Identité du mal de Caderas et de la rage.—*Bull. Acad. Méd.* 1931. July 28. Year 95. 3rd Ser. Vol. 106. No. 28. pp. 71–79. [16 refs.] [Pasteur Inst., Tangiers.]

⁷ SHOPE (Richard E.). An Experimental Study of "Mad Itch" with Especial Reference to its Relationship to Pseudorabies.—*Jl. Experim. Med.* 1931. Aug. 1. Vol. 54. No. 2. pp. 233–248. [12 refs.] [Rockefeller Inst. for Med. Research, Princeton, N.J.]

⁸ REMLINGER (P.), PALMOWITCH (S.) & BAILLY (J.). Action de l'éther sur diverses souches de virus rabiques.—*C.R. Soc. Biol.* 1931. June 30. Vol. 107. No. 21. pp. 760–762. [3 refs.] [Pasteur Inst. of Morocco, Tangiers.]

REMLINGER, PALMOWITCH and BAILLY⁹ in examining a number of strains of fixed virus, find that some of these are peculiarly prone to cause paralytic accidents in the dog. Others are quite inoffensive. Although the dog is more subject to such accidents than man, the results obtained are important. A virus T has been used in the case of more than 2,000 dogs with a single rather doubtful case of paralysis. A virus Z was exhibited to 4 dogs, 2 by the method of Becker Philipps, and two after etherization, without untoward effect. Seven dogs were vaccinated with a virus V, 2 by the Becker Philipps method, and 5 after etherization. A fatal case of paralysis occurred in one case which had been given ether vaccine. Eight dogs were treated with a virus B, 2 by the Becker Philipps method, the remainder with etherized vaccine; one of the former group showed paralysis after 21 days and died, and one of the second group became paralysed after 18 days, and likewise died. The authors conclude that all institutes should be supplied with a standard inoffensive strain. [This would appear to be a further example of the varying resistance of strains of fixed virus to ether—and other substances—referred to in the previous paper.]

A strain of street virus of exalted virulence (Safad virus) has been investigated by STUART and KRIKORIAN¹⁰. Seven persons were bitten by a rabid jackal and three, in spite of treatment, developed rabies. The incubation periods of the three fatal cases were respectively 17 days (one: deep: face), 29 days (two: deep: face) and 37 days (one: deep: head). Treatment was commenced in each case two days after the bite was inflicted. This virus (Safad) was compared with fixed virus (Paris) and a strain of street virus from Jaffa. Using the definition of a minimum lethal dose as, "the highest dilution of a virus which, in rabbits of average weight (1,400 gm.) will invariably produce symptoms in the same period of time after subdural infection with 0.2 cc.", the authors found that this dilution was 1 in 1,000 in the case of each of the three viruses. The Safad virus caused illness in 7 days in the rabbit, and death on the 8th day. Negri bodies were present in the human brain from which the virus was derived but were not found in the brains of any of the rabbits of a subpassage series.

Cross immunity experiments were carried out between the Paris fixed virus and the Safad virus. The Paris virus afforded 100 per cent. protection against the homologous strain and 60 per cent. against the Safad strain. Also sera of rabbits treated with Paris virus neutralized 6 volumes of a 1 per cent. suspension of the homologous strain, and 4 volumes of the Safad strain. Again vaccination with the Safad virus afforded 40 per cent. protection against the homologous strain, and 20 per cent. against the Paris strain. Also sera from a rabbit treated with Safad virus neutralized 2 volumes of the homologous virus, and one volume of the Paris strain.

⁹ REMLINGER (P.), PALMOWITCH (S.) & BAILLY (J.). Pluralité des virus rabiques fixes. Nocivité de quelques-uns.—*C.R. Soc. Biol.* 1931. July 16. Vol. 107. No. 23. pp. 1050-1052. [Pasteur Inst. of Morocco, Tangiers.]

¹⁰ STUART (G.) & KRIKORIAN (K. S.). Further Studies in Anti-Rabies Immunisation. Rabies Virus—Exalted and Classical Strains compared.—*Jl. Hygiene.* 1931. Oct. Vol. 31. No. 4. pp. 523-542. [40 refs.] [Central Labs., Health Dept., Govt. of Palestine.]

KAKTIN¹¹ reports that the fixed virus strain in use at Riga came originally from Paris. It is at present in its 1,603rd passage. Its minimum lethal dose for rabbits was found to be 0.1 cc. of a 1 in 300,000 dilution from an experiment conducted on 15 rabbits. A subcutaneous dose of 0.1 cc. of a 1 in 10 emulsion is not infective to either guineapigs or rabbits. Intravenous doses were also innocuous. Rabies frequently developed after intracutaneous inoculation of large doses but seldom after intramuscular doses.

ii. Clinical.

GORDON¹² describes a case of protracted incubation. The patient, a man aged 19 years, was bitten on the hand by a stray dog. Treatment by Högyes method (in all 205 mgm. of brain substance over a lengthy period), was commenced on the day after he had been bitten. On the 346th day after the bite he became ill, and exhibited the classic symptoms of rabies. On the 353rd day he died. Numerous Negri bodies were found in his brain, and rabbits inoculated with portions of his brain developed rabies in 15 days.

iii. Pathology.

In a previous paper PALAWANDOW and SEREBRENNAJA¹³ (this *Bulletin*, Vol. 28, p. 245) reported the cases of two persons suffering from rabies whose saliva on the day previous to death was found to contain the virus. They now add to these a further group of three cases in which a like result, as proved by animal inoculation and the finding of Negri bodies in the brains of the experimental animals, was obtained. They again emphasize the fact that in order to observe positive results, at least 2 cc. of saliva must be given intramuscularly, preferably to guineapigs.

PALAWANDOW and SEREBRENNAJA¹⁴ have failed to confirm the observation of REMLINGER and BAILLY that the virus when introduced into the brain of dog or rabbit disappears at the site of inoculation within 24 hours (the phenomenon of "eclipse"), and then reappears 2 to 3 days later (this *Bulletin*, Vol. 27, p. 251). From experiments on 45 rabbits with fixed virus they find that there is rather a gradual heaping up of virus in the brain. A similar series of experiments on 73 rabbits with street virus gave a like result. With a strain of street virus with a very short incubation period the virus can be recovered even after 24 hours. The factors which are important are the incubation period of the virus, and the dose administered.

The degree of antibody production after treatment with living

¹¹ KAKTIN (A.). Ueber einige biologische Eigenschaften des in Riga verwendeten Virus fixe. I. Mitteilung.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 72. No. 5/6. pp. 457-461. [4 refs.]

¹² GORDON (J.). Sur l'incubation énormément prolongée de la rage humaine.—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 1. pp. 31-38. [12 refs.] [In Russian. French summary pp. 38-39.]

¹³ PALAWANDOW (H.) & SEREBRENNAJA (A. I.). Ueber das Wutvirus im menschlichen Speichel. III. Mitteilung.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 71. No. 3/4. pp. 350-351. [State Bact. Inst., Odessa.]

¹⁴ PALAWANDOW (H.) & SEREBRENNAJA (A. I.). Ueber den Befund von Wutvirus im Zentralnervensystem bei Tieren während verschiedener Inkubationsstadien bei subduraler Infizierung.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 71. No. 3/4. pp. 352-358. [3 refs.] [State Bact. Inst., Odessa.]

fixed virus, killed carbolized fixed virus and killed etherized fixed virus has been investigated by STUART and KRIKORIAN¹⁵. The amount of brain substance inoculated was in each case 1.4 gm. given over a period of 14 days. The maximum power of neutralization was in the case of living fixed virus, 1 vol. of serum to 16 vols. of a 1 per cent. suspension of fixed virus; the proportion in the case of killed carbolized virus was 1 to 8 vols.; and in the case of killed etherized vaccine it was 1 to 24 vols. The times of earliest appearance were, in the same order, 18 days after commencement of treatment, 18 days, and 14 days. The maxima occurred in all the three types between the 50th and the 60th day after completion of treatment. The periods of retention of rabicidal properties were 222 days, 131 days, and 226 days. The authors conclude that in the immune sera of rabbits treated with killed etherized fixed virus, antibodies make an earlier appearance, are present in greater degree, and persist for a longer time than in the sera of rabbits treated with equal quantities by weight of fresh fixed or of killed carbolized virus.

iv. *Methods of Treatment and Statistics.*

REMLINGER, PALMOWITCH and BAILLY¹⁶ have investigated the statement of LÖFFLER and SCHWEINBURG (this *Bulletin*, Vol. 27, p. 751), that repeated inoculations of nerve substance weakens resistance against a subsequent infection with rabies, and that therefore either the quantity of nerve substance used in treatment should be as small as possible, or the lipoids should be extracted from it. In their investigation REMLINGER and his co-workers used 21 rabbits, to which were given 100 cc. of a 1 in 50 emulsion of normal brain of the cat in 20 doses. Five days after the last injection the rabbits were tested with 0.5 cc. of fixed virus, graded in strength from 1 in 2,000 to 1 in 150,000; one untreated animal receiving a similar dose in each grade. There was no evidence of any weakened resistance.

According to HÖGYES a dilution of 1 in 5,000 of fixed virus is sometimes fatal to the rabbit, and a dilution of 1 in 10,000 is never harmful. REMLINGER, PALMOWITCH and BAILLY¹⁷ rightly point out that this view, which is axiomatic, and is the basis of the dilution method of treatment, cannot be accepted. The determination of a minimum lethal dose cannot be exact on account of variations in technique (and statistical variation). Dilutions up to 1 in 300,000 have from time to time, as is to be expected, given positive results when inoculated in a dose of 0.5 cc. subdurally. "One recognizes also the gravity of the paralyses which occur during treatment by dilutions of virus. It is in effect a question, in these cases, less of paralyses of treatment than of true paralytic rabies."

¹⁵ STUART (G.) & KRIKORIAN (K. S.). Appearance and Persistence in Rabbits' Blood of Rabicidal Antibodies produced by Various Methods of Anti-Rabies Immunisation.—*Jl. Hygiene*. 1931. July. Vol. 31. No. 3. pp. 414-422. With 1 graph. [4 refs.] [Govt. Central Labs., Jerusalem.]

¹⁶ REMLINGER (P.), PALMOWITCH (S.) & BAILLY (J.). La substance nerveuse normale peut-elle rendre les lapins plus sensibles à l'action du virus rabique fixe?—*C.R. Soc. Biol.* 1931. June 19. Vol. 107. No. 20. pp. 683-685. [2 refs.] [Pasteur Inst. of Morocco, Tangiers.]

¹⁷ REMLINGER (P.), PALMOWITCH (S.) & BAILLY (J.). Contribution à l'étude de l'action de la dilution sur le virus rabique.—*C.R. Soc. Biol.* 1931. July 21. Vol. 107. No. 24. pp. 1244-1246. [2 refs.] [Pasteur Inst. of Morocco, Tangiers.]

REMLINGER and BAILLY¹⁸ discuss the value of antirabic serum in the treatment of rabies. "It is difficult to obtain, irregular in its production, and paradoxical in its mode of action."

The successful treatment of eight persons bitten severely by a wolf, by killed phenol vaccine is reported by STUART and KRIKORIAN¹⁹. The dosage amounted to 0.7 gm. over a period of 14 days. The sera of one of the patients was examined for rabicidal properties. These became demonstrable on the 23rd day after the commencement of treatment, and persisted up to the 88th day. On the 100th day they were no longer apparent. [This high degree of success has not been attained at other institutes. In the first review of antirabies treatment published by the League of Nations, it appears that of 19 persons bitten by wolves and treated by killed vaccines, 5 died. The fatal cases were reported from Bombay (5 out of 15 treated) as is shown in Appendix xxiv *bis* of that review. It is to be noted, however, that of the 5, one was one day late in commencing treatment, a second was 7 days late, a third was 25 days late, and the remaining 2 were 30 days late.]

The system of treatment employed at the Antirabic Dispensary in Cyrenaica is described by MEDULLA²⁰. The vaccine is Puntoni's modification of Fermi phenol vaccine. During the years 1928, 1929, 1930 and 1931, 7, 18, 21 and 7 persons respectively were successfully treated.

Treatment²¹ at the Pasteur Institute of the Charity Hospital, New Orleans (U.S.A.), was afforded to 766 persons during the year 1929, and to 467 during 1930. The method employed is that of Semple. One patient, 7 years old, and bitten severely about the face, died of rabies 41 days after completion of a course of 14 days' treatment. No paralytic accidents were observed.

The question of decentralization of antirabic treatment is discussed by BOBES²². It has been applied in Russia, in India, and in Germany, the vaccines used being prepared according to the methods of Calmette, Fermi, Philipps, Semple, etc. Decentralization has obvious advantages, but there are disadvantages which the author lays stress on. "The difficulty of gauging the intensity of treatment in individual cases, the difficulty of avoiding paralytic accident, the difficulty of keeping the animal under rigorous control during the period of observation, and finally the diversity of methods of treatment. Only when statistical evidence collected by the League of Nations and based upon results from all institutes renders it possible to establish a standard method of treatment, will one be in a position to consider decentralization."

¹⁸ REMLINGER (P.) & BAILLY (J.). La déchéance du sérum antirabique.—*Bull. Acad. Vét. de France*. 1931. May 7. pp. 239–243. [Summarized in *Bull. Inst. Pasteur*. 1931. Oct. 31. Vol. 29. No. 20. pp. 989–990.]

¹⁹ STUART (G.) & KRIKORIAN (K. S.). Anti-Rabies Immunisation. Value of Killed Carbolic Virus in Cases of Wolf-Bite.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 49–56. [11 refs.]

²⁰ MEDULLA (Candido). Dati statistici sul funzionamento del dispensario antirabico dall' ottobre 1928 all' aprile 1931.—*Arch. Ital. Sci. Med. Colon.* 1931. Oct. 1. Vol. 12. No. 10. pp. 605–612. With 1 text fig. English summary (2 lines).

²¹ D'AUNOY (Rigney) & BEVEN (J. L.). Antirabic Vaccinations at the Charity Hospital of New Orleans for the Years 1929–1930.—*Amer. J. Clin. Path.* 1931. July. Vol. 1. No. 4. pp. 333–338. [Charity Hosp., & Med. School, Louisiana State Univ., New Orleans.]

²² BOBES (S.). Problema institutelor antirabice.—*Rev. Igienă Socială*. Bucharest. 1931. Jan. Vol. 1. No. 1. pp. 31–36. French summary.

v. *Post-Vaccinal Accidents.*

A case of paralytic accident is described in detail by VAMPRE and CARVALHO²³. The patient received a 14 day treatment with cords dried from 7 to 2 days. The symptoms were those of paralysis of legs, and retention of urine and faeces. Reflexes were abolished. Sensibility was lost below the waist. Galvanic response was not impaired. The etiology, diagnosis, prognosis, and treatment of the condition, are discussed.

vi. *Rabies in Animals.*

REMLINGER and BAILLY²⁴ have extended their observations on the persistence of rabies virus in the brain of the tortoise. In a previous communication (this *Bulletin*, Vol. 27, p. 252), they stated that it persisted for at least 54 days. They now in a series involving 26 tortoises, find that this period may be extended to 302 days.

A case of rabies in a badger is reported by LENTZE²⁵. Negri bodies were found in the brain, and animal inoculation proved positive.

Vaccine consisting of 15 parts of fixed virus brain substance, in 85 parts of glycerinated and phenolized physiological salt solution (30 per cent. glycerine and 0.5 phenol), is employed in the treatment of animals by TORRES²⁶, at Rio de Janeiro. The vaccine retains its activity for about 100 days when kept at 10° C. The dosage varies from 3 cc. for small dogs to 40 cc. in the case of animals of over 500 kgm. A single dose is given. The immunity lasts for about a year. In the years 1927, 1928 and 1929, 1,219, 1,352, and 1,691 animals were inoculated in the state of Espirito Santo. There has been a fall in the cases of rabies reported, viz.: 837 in 1925, 595 in 1926, 355 in 1927, and 155 in 1928, in the municipality of Cariacica. The communication is followed by a general discussion on the antirabic treatment of animals by a commission elected for the purpose.

Using a 1 in 10 dilution of street virus (formulated 1 per cent.), GALEA²⁷ found that a minimum of 20 cc. (i.e., 2 gm. of nerve substance) in a single dose is necessary for immunizing the rabbit. Using repeated doses of a 1 in 10 dilution of vaccine (formulated 4 per thousand), dogs can be made to resist intra-ocular infection made 24 hours after vaccination. Cutivaccination of guineapigs with 2 to 4 grams of vaccine (formulated 1 per cent.) failed to give satisfactory results.

²³ VAMPRE (E.) & CARVALHO (Pedro Egydio de Oliveira). Em torno de um caso de accidente paralytico do tratamento anti-rabico.—*Brasil-Medico*. 1931. Sept. 5. Vol. 45. No. 36. pp. 821-827. With 3 text figs. [Psychiat. & Neurol. Clinic, Faculty of Med., S. Paulo.]

²⁴ REMLINGER (P.) & BAILLY (J.). Sur la longue persistance (302 jours) du virus rabique dans l'encéphale de la tortue.—*C.R. Soc. Biol.* 1931. Oct. 30. Vol. 108. No. 30. pp. 466-468. [1 ref.] [Pasteur Inst. of Morocco, Tangiers.]

²⁵ LENTZE (F. A.). Bissverletzung durch tollwütigen Dachs.—*Muench. Med. Woch.* 1931. July 17. Vol. 78. No. 29. p. 1218. [3 refs.] [Hyg. Inst., Univ., Breslau.]

²⁶ TORRES (Sylvio). Technica para preparo de vaccina antirabica para uso animal.—*Rev. Zootechnia e Vet.* 1931. Vol. 17. No. 2. pp. 129-140. [2 refs.]

²⁷ GALEA (M.). Recherches sur la vaccination antirabique avec du virus des rues formolé.—*Arch. Roumaines Path. Expér. et Microbiol.* Paris. 1930. Dec. Vol. 3. No. 4. pp. 447-457. [22 refs.]

The intravenous inoculation of 25 cc. of vaccine (formolized 4 per cent.) established a solid immunity.

SCHOENING²⁸ again discusses the efficiency of single doses of phenol killed and chloroform killed vaccines (see also this *Bulletin*, Vol. 28, p. 748). He favours the second variety both as regards potency and as regards safety.

A general review of antirabies immunization is furnished by KELSER²⁹, which incidentally covers the same ground as the above.

PLANTUREUX³⁰ records results of the treatment of bitten animals by formolized vaccine. (See also this *Bulletin*, Vol. 27, p. 263). Of a total of 79 animals—16 horses, 15 donkeys, 40 cattle, 2 goats, and 6 swine—treated with 4 inoculations at intervals of a week by formolized vaccine, two contracted the disease. These were two young cattle, severely bitten on the ears. The one died on the 13th day, and the other on the 43rd.

vii. Miscellaneous.

GLUSMAN, GORFUNKEL and SSOLOWIEWA³¹ have conducted a series of experiments on the cataphoresis of rabies virus—(see also this *Bulletin*, Vol. 28, p. 247). The apparatus employed is that of TORU as modified by SSINZOWA. The emulsion in a concentration of 1 in 500 is made up with potassium biphthalate, biphosphate, and borate as buffers to a pH of 6.0 to 9.3. After the passage of a current for from 2 to 3 hours material is withdrawn from the anode and from the cathode, and injected into rabbits. In a series of 27 experiments with fixed virus, the virus was found at the anode in 21, at the cathode in 6, and it was present at both poles in 6. The pH in this series lay between 6.0 and 9.3. As the pH rises so does the rate of separation fall. The authors state that a movement of the whole emulsion took place, and that there was no evidence of a separation of the virus from the material to which it was attached.

As the result of a series of experiments MARIE and URBAIN³² conclude that there is no evidence of antagonistic action between the viruses of herpes and of rabies. When mixed in vitro there was no evidence of neutralization of one virus by the other, and cross immunity experiments gave negative results.

A. G. McKendrick.

²⁸ SCHOENING (H. W.). Immunization of Dogs against Rabies by the One-Injection Method.—*Amer. J. Public Health* 1931. June. Vol. 21. No. 6. pp. 637-640. [7 refs.] [U.S. Bureau of Animal Industry, Washington, D.C.]

²⁹ KELSER (R. A.). Rabies Immunization.—*Milit. Surgeon*. 1931. July. Vol. 69. No. 1. pp. 34-41. [8 refs.] [Army Med School, Washington.]

³⁰ PLANTUREUX (E.). Sur le traitement des herbivores après morsure par le vaccin antirabique formolé.—*Rev. Gén. de Méd. Vét.* 1931. Nov. 15. Vol. 40. No. 479. pp. 649-652. [1 ref.] [Pasteur Inst. of Algeria, Algiers.]

³¹ GLUSMAN (M. P.), GORFUNKEL (D. M.) & SSOLOWIEWA (J. W.). Zur Frage der elektrischen Ladung des Lyssa-Virus.—*Zent. f. Bakt. I. Abt. Orig.* 1931. Aug. 11. Vol. 121. No. 7/8. pp. 476-481. With 1 text fig. [19 refs.] [Metschnikow Inst., Kharkov.]

³² MARIE (A. C.) & URBAIN (Ach.). Sur l'antagonisme du virus herpétique et du virus rabique.—*C.R. Soc. Biol.* 1931. Sept. 18. Vol. 107. No. 26. pp. 1488-1490. [2 refs.]

YELLOW FEVER.

BEEUWKES (Henry) & HAYNE (T. B.). **An Experimental Demonstration of the Infectivity with Yellow Fever Virus of *Aedes aegypti* captured in an African Town.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Aug. 8. Vol. 25. No. 2. pp. 107-110. [1 ref.] [West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos, Nigeria.]

The difficulty of clinical identification of mild cases of yellow fever led the authors to test the possibility of demonstrating the existence of active virus in mosquitoes caught in endemic regions. Catches were made in native houses at Ife where protection tests showed that 68 per cent. of 25 children had contracted the disease [see this *Bulletin*, Vol. 28, p. 283].

Two normal monkeys were exposed to the bites of 156 mosquitoes, but with negative results; finally, 143 mosquitoes remaining alive were killed, and an emulsion of their bodies inoculated into these same two monkeys. The first of these died of typical yellow fever 4 days later, and the second had a non-fatal attack of this disease. Subsequently 561 *Aedes* were caught in the same region and tested, but failed to produce any infection and similar negative results were obtained with large numbers of mosquitoes caught in Ibadan, another endemic centre. It would seem, therefore, that in spite of the positive result in the first experiment, the chances of capturing infected mosquitoes in native towns are too remote for this method to constitute a satisfactory aid in confirming the existence of active infection in any area.

E. Hindle.

FROBISHER (Martin), Jr., DAVIS (Nelson C.) & SHANNON (Raymond C.). **On the Failure of Yellow Fever Virus to persist in a Colony of *Aedes aegypti*.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 142-146. [4 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

The experiments of ARAGÃO and da Costa LIMA [see this *Bulletin*, Vol. 26, p. 1001], showed that yellow fever might be produced by the dejecta of infected mosquitoes, whilst ARAGÃO [*ibid*, p. 1002] also showed that the virus might pass from the male to the female mosquito and vice versa, presumably by coitus. In order to test the possibility of the infection being maintained in this way, the authors placed 300 freshly fed infected mosquitoes inside a breeding cage together with 90 males. The eggs laid by these insects were hatched out separately and these newly hatched mosquitoes added to the breeding cage. A normal rhesus monkey was placed in the breeding cage every fortnight to test the infectivity of the mosquitoes. The results show that the colony remained infective for at least 12 weeks when the original mosquitoes were 103 to 104 days old, but beyond 16 weeks the infectivity had died out. It seems practically certain, therefore, that in nature yellow fever is not self propagated among mosquitoes and that they could not remain infective without some suitable vertebrate host.

E. H.

DAVIS (Nelson C.) & SHANNON (Raymond C.). **Further Attempts to transmit Yellow Fever with Mosquitoes of South America.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 715-722. [4 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

Various species of Brazilian mosquitoes were allowed to feed on monkeys infected with yellow fever and after they had been kept in the laboratory for 12 or more days were allowed to bite normal monkeys. Also the survival of virus in these insects was tested by injecting their bodies into normal monkeys. The virus was found to survive for 12 or more days in *Aedes terreus*, *Aedes serratus*, *Psorophora cingulata*, *Psorophora ferox*, *Mansonia fasciolata*, *M. chrysonotum*, and *M. albicosta*. It was not found to survive for this period in *Aedes fulvithorax*, *Anopheles albitarsis*, *An. tarsimaculatus*, *Culex quinquefasciatus*, and *Joblotia digitata*. No infections resulted from the bites of any of the species used in these tests.

E. H.

BAUER (Johannes H.). **Some Characteristics of Yellow Fever Virus.**—*Amer. Jl. Trop. Med.* 1931. Sept. Vol. 11. No. 5. pp. 337-353. [11 refs.] [Labs. of the W. African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

The author gives interesting details of the very high concentration of yellow fever virus in the blood of infected rhesus monkeys at the onset of fever. Eighteen specimens tested in dilutions of 1 : 1,000,000 all proved infective, and of six specimens tested in dilutions of 1 : 1,000,000,000 three produced fatal infections in normal monkeys. A considerable variation in susceptibility was observed when these high dilutions were employed, and very small amounts of virus often immunized animals without producing any outward signs of infection [as noted by the reviewer, see this *Bulletin*, Vol. 26, p. 292]. In the majority of these animals inoculated with minute doses, the infection was characterized by a rather long incubation period, followed usually by a short but acute febrile attack and death.

Human hydrocele fluid from persons not immune to yellow fever, either concentrated or diluted with equal parts of physiological saline, was found to be a satisfactory diluent of the virus for titration purposes.

The development of yellow fever antibodies in the blood of experimentally infected animals was found to take place early during the course of the disease and the serum of monkeys that died on the seventh day after inoculation or later, protected fully against massive doses of the virus. Curiously enough, however, the serum of monkeys inoculated with very minute doses of the virus, and which died of yellow fever after a long incubation period, showed no protective properties.

The virus was found to survive in the body for some time after death, for the blood of a monkey that died of yellow fever and was kept after death for nine hours at a temperature of 78 to 86.5° F. was still infective in amounts of 0.01 cc., although 0.0001 cc. failed to infect. The organs of this animal were then in an advanced state of decomposition; therefore the virus must possess considerable resistance against the action of post-mortem invading bacteria.

E. H.

SELLARDS (Andrew Watson). **The Behavior of the Virus of Yellow Fever in Monkeys and Mice.**—*Proc. Nat. Acad. Sci.* 1931. June. Vol. 17. No. 6. pp. 339-343. [2 refs.] [Harvard Med. School, Boston.]

A strain of yellow fever virus maintained by repeated passage from brain to brain in mice till it no longer infected monkeys by the ordinary routes of injection, was compared with the original strain that had been maintained in monkeys and mosquitoes. Monkeys inoculated intracerebrally with a suspension of infected mouse brain regularly developed a fatal encephalitis, but without any characteristic changes in the liver. The blood of these animals was not infective to monkeys in two experiments, one by direct inoculation and the other by means of mosquitoes.

Direct inoculation from brain to brain through a series of four monkeys failed to restore the virulence of the strain, which still produced no infection when inoculated intraperitoneally into monkeys. Two monkeys inoculated intracerebrally with blood virus died of typical yellow fever with necrosis of the liver and no signs of encephalitis.

The results of cross-immunity tests were consistent with the interpretation that the virus in mice is yellow fever, but the cross protection although very well-marked was not entirely complete.

E. H.

SAWYER (W. A.) & LLOYD (Wray). **The Use of Mice in Tests of Immunity against Yellow Fever.**—*Jl. Experim. Med.* 1931. Oct. 1. Vol. 54. No. 4. pp. 533-555. With 1 fig. [18 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, New York.]

The authors have modified THEILER's original method of using mice in yellow fever immunity tests [this *Bulletin*, Vol. 27, p. 872], as the small amount of serum that could be injected intracerebrally failed to give complete protection in a number of cases. It was found that if mice were injected intraperitoneally with a large dose of yellow fever virus, fixed for mice, and at the same time some slight injury was made in the central nervous system, the mice died of yellow fever encephalitis. The virus was found to circulate in the blood up to 4 days before becoming localized in the brain. Using this technique a method of testing sera has been developed which the authors call the "intraperitoneal protection test in mice." The test consists of the intraperitoneal inoculation of mice with a mixture of mouse yellow fever virus, and the serum to be tested, and at the same time an intracerebral injection of 0.03 cc. of 2 per cent. corn starch in 0.9 per cent. sodium chloride, in order to localize the virus in the brain. If the serum lacks protective power the mice die of yellow fever encephalitis. It was found that different strains of mice varied considerably in their susceptibility to the virus and it would be preferable to use the same strain bred on the premises. The amount of virus is important, for in one experiment whilst quantities of less than 0.2 cc. of a 10 per cent. suspension of mouse brain were not always fatal, doses of this amount or more invariably caused death. Consequently this dose of virus was adopted, and mixed with 0.4 cc. of the serum to be tested, and the mixture inoculated intraperitoneally. If the mouse did not succumb within 10 days there was considered to

be evidence of protection. The test was found to be highly sensitive and many sera which protected mice did not protect monkeys, although all those which protected monkeys also protected mice. Consequently, it will be of value in epidemiological studies to determine whether individuals have ever had yellow fever, and also to test whether vaccinated persons or animals have in reality been immunized. Finally attention is called to the unusual precautions necessary to avoid the infection of laboratory personnel with yellow fever virus from infected mice, three such infections having already occurred.

E. H.

TORRES (C. Magarinos). [In Portuguese & English.] *Degeneração oxychromatica* ("inclusões intranucleares") na febre amarela. **Oxychromatic Degeneration ("Intranuclear Inclusions") in Yellow Fever.**—*Mem. Inst. Oswaldo Cruz*. 1931. Vol. 25. No. 2. In Portuguese pp. 81–147. With 72 coloured figs. on 3 plates. [46 refs.] In English pp. 148–211.

This valuable monograph contains a complete summary of the author's observations since his original paper, in which he first called attention to the significance of intranuclear inclusions in the liver cells of monkeys infected with yellow fever [see this *Bulletin*, Vol. 26, p. 301]. It is rather unfortunate that this characteristic oxychromatic degeneration, although nearly always present in monkeys dying of yellow fever, is frequently absent in human cases of the disease where a character of this nature, if constantly present, would be of great assistance in the histopathological diagnosis of doubtful cases.

The author discusses the various changes occurring in the nuclei and their significance, and his paper is very well illustrated by coloured figures giving a clear picture of these changes. The article should be consulted in its entirety by all those interested in the subject, since it contains many technical details and observations that do not lend themselves to abstraction.

E. H.

FROBISHER (Martin), Jr. **Electrophoresis Experiments with the Virus and Protective Bodies of Yellow Fever.**—*Jl. Experim. Med.* 1931. Nov. 1. Vol. 54. No. 5. pp. 733–745. With 1 text fig. [20 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

The author has investigated the electrophoresis of yellow fever virus and its antibodies, using a U-tube apparatus with a central arm by means of which the suspension could be introduced. Although many of the results were indefinite, evidence was obtained that in clear, haemoglobin-free, serum dilutions, with a pH of 7·4 to 7·7, the active virus, both from the blood and the mosquito, travels towards the negative pole. Between pH 7·4 and pH 6·2 the virus passes through its isoelectric range and then tends to reverse the direction of its migration, thus behaving like an amphoteric colloid. At a pH of 5·0 it is inactivated within three hours. When the suspension was mixed with red cells and distilled water, the virus also migrated towards the positive pole, possibly because it adsorbed haemoglobin. These results agree in the main respects with those obtained by HINDLE and FINDLAY [see this *Bulletin*, Vol. 27, p. 872.]

The antibodies were similarly examined by introducing immune serum into the central arm of the U-tube and then testing the protective value of the contents of anode and cathode arms after passing a current for about 5 hours. In slightly alkaline dilutions the protective bodies were found to carry a negative charge.

E. H.

WAKEMAN (A. Maurice) & MORRELL (Clare A.). **Chemistry and Metabolism in Experimental Yellow Fever in *Macacus rhesus*.** IV. **Tolerance Tests for Dextrose.**—*Arch. Intern. Med.* 1931. Aug. Vol. 48. No. 2. pp. 301–312. With 4 charts. [8 refs.] [Lab. of the W. African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

The response of the blood sugar of normal monkeys to dextrose administered by mouth is irregular; monkeys seriously ill with yellow fever show practically no increase in blood sugar after the ingestion of 1 gm. per kilo, chiefly because the sugar is absorbed very slowly, if at all, from the alimentary canal. Tolerance for sugar is diminished in yellow fever before the monkey becomes prostrate. Dextrose injected intravenously is not so rapidly removed from the blood of monkeys ill with yellow fever as from the blood of normal monkeys. In the latter the intravenous injection of dextrose produces accelerated glycogenesis in the liver and there is a crossing of the curves for arterial and venous blood sugar. This crossing is absent in yellow fever monkeys, indicating a loss of hepatic function.

E. H.

FROBISHER (Martin), Jr. **An Improved Antigen for the Complement-Fixation Test in Yellow Fever.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 147–148. [5 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

An improved antigen has been prepared by extracting the fat from the dried livers of infected rhesus monkeys. The paste of each liver was placed in a desiccator and dried over sulphuric acid *in vacuo*; subsequently the dried livers were placed in a Soxhlet's apparatus and treated with ether for 8 hours or more. The fat-free residue has been found to preserve its properties for some months at room temperature.

E. H.

HUDSON (N. Paul). **Protective and Complement-binding Bodies in the Serum of Human Yellow Fever Convalescents.**—*Proc. Soc. Experim. Biol. & Med.* 1931. June. Vol. 28. No. 9. pp. 937–939. [Internat. Health Division, Rockefeller Foundation, & Dept. of Hyg. & Bact., Univ., Chicago.]

The author made a serological study of five cases of yellow fever due to laboratory infections. The results show that protective antibodies appeared in the blood five days after the onset of illness, whilst the complement fixation in the same patients did not develop until after 8 weeks in four cases, and remained negative in the fifth. The appearance of positive fixation reactions later than protective antibodies is of interest and suggests either the crudeness of the test or the persistence of virus in the host.

E. H.

FINDLAY (G. M.) & HINDLE (E.). **Combined Use of Living Virus and Immune Serum for Immunization against Virus Infections.**—*Brit. Med. J.* 1931. May 2. pp. 740-742. [18 refs.]

The authors recommend the use of virus and immune serum for immunization against virus diseases in general, and give records of experiments with this method in the case of two widely different infections, vaccinia and yellow fever. In the case of yellow fever it is shown that whereas the duration of passive immunity rarely exceeds four or five weeks, when a dose of virus is given at the same time as the immune serum a more lasting immunity is obtained which in the case of monkeys has been tested up to a minimum of fourteen months.

It is also shown that yellow fever immune serum has no apparent action upon the virus *in vitro*, for a mixture of virus and immune serum, after standing for eighteen hours, was centrifuged, and the resulting sediment washed three times to remove the immune serum. The washed sediment was inoculated into a rhesus monkey, which died six days later of typical yellow fever, whilst another monkey inoculated with part of the original mixture showed no signs of infection but was immunized.

E. H.

ARAGÃO (Henrique de Beaurepaire). [In Portuguese & English.] **Sôro-virus vacinação na febre amarella. Vaccination with Serum-Virus in Yellow Fever.**—*Mem. Inst. Oswaldo Cruz.* 1931. Vol. 25. No. 2. In Portuguese pp. 213-219. In English pp. 220-226.

The author records the results of inoculating five rhesus monkeys with yellow fever virus and immune serum. In every case a solid immunity was produced without any ill effects being observed. Doses of less than 1 cc. of immune serum in monkeys did not prevent a febrile reaction and therefore doses of 4 to 5 cc. are recommended for human cases. It is suggested that the use of serum-virus might give satisfactory results for human vaccination. [FINDLAY and HINDLE (above) also recommend a trial of this method.]

E. H.

DINGER (J. E.). Dengue en gele koorts. I. Inleiding. [**Dengue and Yellow Fever.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. June 20. 75th Year. No. 25. pp. 3363-3369.

The question of conferment of immunity to yellow fever by a previous infection with dengue was tested out on monkeys. Eleven monkeys, which had suffered from dengue 13 to 36 days previously were inoculated with virulent yellow fever material. Of these three died of typical yellow fever, and the remainder were unaffected, while control animals showed a 90 to 100 per cent. mortality. In this experiment there is a strong presumption that the survival of so many animals was due to the production of immunity to yellow fever brought about by a previous attack of dengue.

Trials upon volunteers show that there is every reason to believe that 5 and 7-day fevers are identical with dengue, for the fever in these experimental cases is sometimes of similar duration. In other ways also this disease is very variable, as for example in the matter of the peaks of the saddle temperature curve. The marked leucopenia which

is characteristic of dengue is probably partly due to destruction of polynuclears and partly to their differential distribution in the body. Relapses did not occur.

W. F. Harvey.

PEÑA CHAVARRÍA (Antonio), SERPA (Roberto) & BEVIER (George). La epidemia de fiebre amarilla en el Socorro (Colombia) 1929. [**The Yellow Fever Epidemic of 1929 in Socorro (Colombia).**]—*Medicina Paises Cálidos*. Madrid. 1931. May & July. Vol. 4. Nos. 3 & 4. pp. 217-235; 315-326. With 3 maps, 1 chart & 4 figs. (1 map). [23 refs.]

Before dealing with the actual outbreak to which the title refers the authors present an interesting historical account of yellow fever or presumed yellow fever in Colombia dating from 1509, and follow this by a description of the topography, climate, communications and such factors as may bear aetiological on this disease. Early in 1929 there was an outbreak of disease, which was regarded as influenza and pneumonia in Guadalupe, the next town to Socorro; 59 deaths occurred [the number of cases is not stated, but the total population was 6,300 only]. This outbreak ceased fairly abruptly and in Socorro in April-June there were 150 cases, 50 severe, and 100 mild; there were 34 deaths. In spite of *Aedes aegypti* being numerous, infection did not spread to the districts surrounding Socorro.

The symptomatology in the severe cases was typical and autopsy revealed the usual signs of yellow fever; in the mild or abortive, the acute stage lasted only 24-36 hours, the chief symptoms being marked debility, shivering, rise of temperature to 39° C., severe pains in back and joints, intense headache, congested features, injected conjunctiva with subicteric tinge, pulse 100-120, vomiting and albuminuria. The blood of convalescents protected rhesus monkeys against infection with yellow fever virus, and efforts at mosquito control soon put an end to the outbreak. If the Guadalupe outbreak was not yellow fever, the origin of that in Socorro is obscure as no introduction could be traced, and the town is comparatively isolated; it is possibly an endemic centre. Attention is drawn to a condition known as *Neiva Fever*, which occurs in the Department of Huila and which the authors are inclined to think is yellow fever in the mild form.

H. H. S.

KUMM (Henry W.). **The Geographical Distribution of the Yellow Fever Vectors. A Compilation of Material recorded in the Literature, Unpublished Communications, and Certain Collections made by the Author in Nigeria, West Africa.**—*Amer. Jl. Hyg.* Monographic Series. 1931. July. No. 12. pp. iii+110. With 19 maps. [320 refs.]

A compilation which will be of value to all workers on this subject.

E. H.

CUMMING (Hugh S.). **Present Day Problems of Yellow Fever.**—*Southern Med. Jl.* 1931. Oct. Vol. 24. No. 10. pp. 873-876. Also in *Public Health Rep.* 1931. Oct. 2. Vol. 46. No. 40. pp. 2361-2366.

A clear statement of the subject.

E. H.

SNIJDERS (E. P.). **The Yellow Fever Problem in the Far East.**—*Far Eastern Assoc. Trop. Med. Trans. Eighth Congress, Bangkok, December 1930.* pp. 133–145.

A general account with special reference to the results obtained by the author in conjunction with SCHÜFFNER, DINGER and SWELLENGREBEL.
E. H.

DE VOGEL (W.). Sur l'emploi de la souris blanche pour les recherches sur la fièvre jaune. [**The Use of White Mice in the Study of Yellow Fever.**]—*Bull. Office Internat. d'Hyg. Publique.* 1931. July. Vol. 23. No. 7. pp. 1210–1215. With 4 figs. on 1 plate.

PUBLIC HEALTH REPORTS. 1931. Oct. 2. Vol. 46. No. 40. pp. 2366–2371.—**The Use of the White Mouse in Research on Yellow Fever. Experiments carried on at the Laboratory of Tropical Hygiene of the Colonial Institute of Amsterdam.**

An account of the experiments of THEILER [this *Bulletin*, Vol. 27, p. 872] and DINGER [*ibid.*, Vol. 28, p. 722].
E. H.

DINGER (J. E.), SCHUEFFNER (W. A. P.) & SNIJDERS (E. P.). Besmettingsproeven van caviae met gele koorts.—*Nederl. Tijdschr. v. Hyg., Microbiol. en Scrol.* 1931. Vol. 6. No. 3. pp. 206–212 [3 refs.]

LESSA (Gustavo). A luta contra a febre amarela.—*Bol. Oficina Sanitaria Panamericana.* 1931. Aug. Vol. 10. No. 8. pp. 1103–1108.

PETIT (Auguste) & STEFANOPOULO (Georges). Vaccination, sierotheapie et chimiotheapie contre la fièvre jaune.—*Giorn. d. Batter. e Immunol.* 1931. Oct. Vol. 7. No. 4. pp. 465–470. English summary. [Pasteur Inst., Paris.]

PUBLIC HEALTH REPORTS. 1931. Nov. 13. Vol. 46. No. 46. pp. 2739–2740.—Influence of Temperature on the Infecting Power of *Aedes aegypti* containing the Yellow Fever Virus. Note communicated to the Permanent Committee of the International Office of Public Hygiene, in its Session of May, 1931, by Dr. W. de Vogel, former Inspector in Chief of the Civil Medical Service of the Netherlands Indies, Delegate from the Netherlands Indies.

DE VOGEL (W.). Influence de la température sur le pouvoir infectant d'*Aedes aegypti* contenant le virus amaril.—*Bull. Office Internat. d'Hyg. Publique.* 1931. July. Vol. 23. No. 7. pp. 1216–1217.

LEPTOSPIROSIS.

MULDER (J.), BONNE (C.) & SARDJITO (M.). Over de leptospirosen waargenomen in de Residentie Benkoelen. [**Leptospirosis in Benkoelen.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Oct. 1. Vol. 71. No. 13. pp. 1090–1137. With 20 text figs. & 3 figs. on 1 plate. [51 refs.] [Mijnbouw Mij Simau Hosp., & Path. Lab., Med. Univ., Batavia.]

Mulder recognized the *Spirochaetosis febrilis* (VERVOORT) as an endemic disease in Benkoelen (Sumatra). It occurs frequently in labourers of the mining company Simau, but is not restricted in its occurrence to the actual miners. Nothing is certain yet about the epidemiology, but further research in this respect (water samples, rats) is being performed.

The clinical picture as usual is a very variable one; it is described in great detail and illustrated by a number of case reports and temperature charts. Mulder paid special attention to the cardiac and vascular symptoms; auricular fibrillation may occur and possibly ventricular fibrillation is the cause of sudden death in some cases. In serious cases and such showing extrasystole the administration of quinidine is recommended. The lowering of the blood pressure without rise of the frequency of the pulse may cause the picture of "asthenic pulse." Jaundice is rather uncommon; it was found in 8 per cent. of the well established cases. Conjunctival injection and the presence of leucocyte casts in the urine may be of diagnostic importance in the beginning of the disease. Certainty is only to be attained by bacteriological examination, i.e., by means of inoculation of guineapigs. Contrary to European experience the serological tests against various strains are much at variance.

W. J. Bais.

HIGUCHI (S.). Untersuchungen ueber das Toxin der *Spirochaeta (Leptospira) ictero-haemorrhagiae*. [**Studies on the Toxin of *S. ictero-haemorrhagiae*.**—*Fukuoka-Ikwadaigaku-Zasshi*. 1931. Jan. Vol. 24. No. 1. [In Japanese. German summary p. 3.] [Faculty of Med., Kyushu Imperial Univ., Fukuoka, Japan.]

The author finds that guineapigs inoculated with a vaccine, prepared by drying *in vacuo* a culture of these spirochaetes, showed fever, hyperaemia of the conjunctiva bulbi, haemorrhages, and jaundice. These symptoms were not due to the presence of any living spirochaetes and are attributed to their toxins.

E. Hindle.

BAUER (Johannes H.). **The Survival of *Leptospira icterohaemorrhagiae* in Old Cultures.**—*Amer. J. Trop. Med.* 1931. July. Vol. 11. No. 4. pp. 259–260. [1 ref.] [Labs. West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos, Nigeria.]

A culture of *Spirochaeta icterohaemorrhagiae* in Noguchi's serum agar medium left standing at room temperature (about 80° F.) in the dark

for 585 days was found to contain active leptospirae. Inoculation into guineapigs showed that the strain had become slightly attenuated, but its full virulence was recovered after five consecutive passages.

E. H.

THIRY (Urbain). Nouvelles recherches sur les Leptospirae aquicoles. [**New Studies on Water Leptospirae.**]—*Arch. Internat. Méd. Expér.* 1931. Oct. Vol. 6. No. 4. pp. 471–546. With 23 text figs. [41 refs.] [Inst. of Hyg. & Bact., Univ., Ghent.]

A useful summary of the author's observations on water leptospirae and especially on the susceptibility of mice to infection with strains occurring in the Ghent water supply [see this *Bulletin*, Vol. 28, p. 311.]

E. H.

LAVAU, RAGIOT, SOUCHARD, FARINAUD & LIEOU. Sur deux cas de fièvre ictéro-hémorragique observés en Cochinchine. [**Two Cases of Spirochaetal Jaundice in Cochin China.**]—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 440–446. With 4 text figs. [Pasteur Inst., Saigon.]

An account of two typical cases of the disease, the first to be recorded from Cochin China, and the demonstration of the spirochaetes by inoculation into guineapigs.

E. H.

BESSEMANS (A.) & THIRY (U.). Réponse à MM Dinger et Verschaffelt à propos de leurs recherches expérimentales sur quelques souches de leptospirae.—*Ann. Inst. Pasteur.* 1931. Oct. Vol. 47. No. 4. pp. 429–444. [9 refs.] [Inst. of Hyg. & Bact., Univ., Ghent.] [See this *Bulletin*, Vol. 28, p. 314.]

HIGUCHI (S.). Ueber die Infektionsversuch des Rattes für die *Spirochaeta* (*Leptospira*) *ictero-haemorrhagiae* und die Verteilung dieser *Spirochaeta* (*Leptospira*) im infizierten Rattenkörper sowie deren Ausscheidungsmasse. —*Fukuoka-Ikwadaigaku-Zasshi.* 1930. Dec. Vol. 23. No. 12. [In Japanese. German summary pp. 92–94.] [I. Med. Clinic, Kyushu Imperial Univ., Fukuoka, Japan.]

HIRSCH (Kurt). Die Kupferresistenz der Spirochäten vom Weil-Typ und Versuche ueber die Reinzüchtung von Wasserspirochäten auf Kupfernährböden. —*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 71. No. 5/6. pp. 459–472. [26 refs.] [Hyg. Inst., Univ., Freiburg i. Br.]

KITAOKA (Masami). Ueber ein neues Phänomen bei Wasserleptospirakultur. Eine Methode zur Reinkultur der Wasserleptospiren mittels dieses Phänomens.—*Zent. f. Bakt.* I. Abt. Orig. 1931. Oct. 1. Vol. 122. No. 4/5. pp. 314–318. With 1 text fig. [21 refs.] [Med. Clinic, Imperial Univ., Tokyo.]

DE LAVERGNE (V.), MASSON (P.) & STUMPF (R.). Réflexions sur l'étiologie de la spirochétose ictéro-hémorragique: origine murine. Transmission par l'eau.—*Rev. d'Hyg. et de Méd. Préventive.* 1931. Oct. Vol. 53. No. 10. pp. 721–730. [7 refs.]

DE LAVERGNE (V.) & STUMPF (R.). Parasitisme des rats de Nancy par *Spirochaeta ictero-hemorrhagiae*. Notion du parasitisme par "clan."—*C. R. Soc. Biol.* 1931. Oct. 12. Vol. 108. No. 27. pp. 69–70. [2 refs.]

SARDJITO. Untersuchungen ueber das biologische Verhalten verschiedener Stämme der *Spirochaeta icterogenes* (*Leptospira icterohaemorrhagiae*) und der *Spirochaeta pseudo-icterogenes* (*Leptospira pseudo-icterohaemorrhagiae*). —*Zent. f. Bakt.* I. Abt. Orig. 1931. Oct. 20. Vol. 122. No. 6/7. pp. 497–506. [6 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

LE GAC. L'épidémie de fièvre récurrente au Ouadaï (Tchad), 1925-1928. [The Epidemic of Relapsing Fever at Wadai (Chad Territory).]—*Ann. de Méd. et de Pharm. Colon.* 1931. Jan.-Feb.-Mar. Vol. 29. No. 1. pp. 148-165. [4 refs.]

A further account of the great epidemic of relapsing fever in Central Africa during 1925-1928. Details are given of the cases occurring in Wadai and also notes on the parasitology and treatment. The spirochaetes (*S. recurrentis*) from the blood were inoculated into *Cercopithecus rubei* and *C. callitrichus* and produced a benign infection which rarely lasted more than five or six days. All attempts to infect *Cynocephalus* gave negative results. The blood formula of 14 cases of relapsing fever gave an average of polymorphonuclears 38.49 per cent., and mononuclears 61.49 per cent. The results of treatment showed that novarsenobenzol, sulphotreparsenan and acetylarsan were all satisfactory; but the use of atoxyl was often followed by relapses, and a bismuth salt, treposan, an oily suspension of bismuth succinate, was found to have no effect on the course of the infection.

E. Hindle.

MATHIS (C.). Les spirochétoses récurrentes en Afrique Occidentale française. [Relapsing Fevers in French West Africa.]—*Bull. Acad. Méd.* 1931. Oct. 13. Year 95. 3rd Ser. Vol. 106. No. 31. pp. 188-198.

A useful summary with a special account of relapsing fever at Dakar. The strain of *S. duttoni* in this region, originally found in a wild shrew mouse, and named *S. crocidurae*, has always been rather a problem, for in spite of its serological identity with the tick-transmitted *S. duttoni*, no one had succeeded in finding *Ornithodoros* or allied ticks in Senegal. Recently, however, Dr. DURIEUX has found specimens of *Ornithodoros erraticus* vel *maroccanus* in an old house in the Isle of Gorée, and these ticks produced a spirochaetal infection in mice on which they were fed. This tick would seem to be the carrier of the Dakar race of *S. duttoni*, whose method of transmission thus falls into line with that of the spirochaete in other parts of Africa.

E. H.

MÁS DE AYALA (Isidro). Estudio clínico de la fiebre recurrente española (230 observaciones). [Clinical Study of 230 Cases of Spanish Relapsing Fever.]—*Medicina Paises Cálidos*. Madrid. 1931. Sept. Vol. 4. No. 5. pp. 369-389. [Refs. in footnotes.]

An interesting study of 230 patients infected, for therapeutic purposes, by experimental inoculation with *Spirochaeta hispanica*. Various methods were used; 80 were inoculated intra- or subcutaneously or conjunctivally with the virus maintained by passage in rat or mouse, 20 by cultures, and 130 by direct transference from a human subject, subcutaneously, intramuscularly or intravenously. Patients were followed up, some for as long as three years, in order that late complications or sequelae, if they occurred, should not be overlooked.

Incubation period. This was found to vary with the number of spirochaetes inoculated and the route chosen. With cutaneous injection of 0.5–1 cc. of virus from the rat or mouse, it was 4–6 days, conjunctivally 6–10 days, with cultures 12–15 days. Direct transmission from patient to patient was followed by very short incubation, 1–2 days if from vein to vein, 2–4 days if subcutaneous or intramuscular. As a rule this period was symptomless, occasionally with anorexia, nausea and diffuse pains.

Onset was always abrupt with nausea, headache, chilliness, general malaise and a rise of temperature to 40° C., face and eyes congested, lips dry, pulse rapidity corresponding to the rise of temperature.

Attacks. The first usually persisted for 3–4 days, with the above symptoms together with drowsiness, prostration and rapid breathing, and in some splenomegaly. Temperature fell by crisis to 36° C. or even lower, occasionally with collapse which, however, responded to adrenalin. After 4 days' apyrexia the second attack occurred with similar symptoms, but usually less intense, lasting 3 days; then 4–6 days' interval, and a third still milder attack. After 4 attacks the disease seemed to come to an end spontaneously, though a few patients had a fifth, very short, attack of a few hours only. When following direct infection from a patient the first attack is usually more severe and subsequent attacks vary. The pulse rate during the accesses is between 120 and 140 per minute and in the intervals 60–80. Contrary to what is recorded in other forms of relapsing fever, the Spanish form does not cause anaemia, though there is a leucocytosis from 14,000 to 26,000 per cmm. in the attacks, falling to 4,000–7,000 in the apyrexial intervals. Labial herpes is not uncommon, and bile pigments in the urine; splenic enlargement, never very great, occurred after the first attack in about half the cases and enlargement of liver in 18 per cent.

Complications. In some 6 per cent. later attacks of fever, resembling the earlier ones, may occur from 15 days to 3 months after the usual "final" access, but no treatment is needed. Facial palsy to actual palsy was seen in 3 per cent., about 6 weeks after the fourth access, disappearing without treatment in 20–25 days. Iritis was found in 3 per cent. and cleared up entirely in 10–20 days.

Evolution and prognosis. Cure occurs spontaneously, usually after 4 attacks of fever, and the prognosis is always good. Infection could always be cut short by neosalvarsan, 0.45–0.6 gm. Spirochaetes are to be found in the peripheral blood a few hours before the attack of fever and though they are very greatly reduced shortly before the crisis they do *not* disappear altogether, and it is to the later multiplication of these few remaining serum-resistant spirochaetes that the relapses are believed to be due. The author states that they may be found even 1–2 months after the final access, but that their action is nullified by antibodies in the serum. Immunity persists for a year and in some patients even longer, after which reinoculation is successful.

Owing to the mildness of the fever, the invariable spontaneous cure and the ease of inoculation the author regards *Sp. hispanica* as the best agent for pyretotherapy. As regards the quantity employed for inoculation, he used 0.25 cc. of citrated blood from a rat or mouse, 0.3 cc. of emulsified culture. For man to man injection 15 cc. of blood is drawn into a syringe containing 5 cc. of 1 per cent. sodium citrate and injected between the scapulae; for direct vein to vein inoculation 2–3 cc. of blood is passed from a patient during a febrile access. This last always gave the best and most assured results. [The question of

alternation of strains in these experimental infections would form an interesting study, which is not referred to in the present article.]

H. H. S.

CLARK (Herbert C.), DUNN (Lawrence H.) & BENAVIDES (Joaquin).

Experimental Transmission to Man of a Relapsing Fever Spirochete in a Wild Monkey of Panama—*Leontocebus geoffroyi* (Pucheran).—*Amer. Jl. Trop. Med.* 1931. July. Vol. 11. No. 4. pp. 243–257. [6 refs.] [Gorgas Memorial Lab., Panama.]

An interesting study of a spirochaete found occurring naturally in the blood of squirrel monkeys, *Leontocebus geoffroyi*, caught in the Republic of Panama, which seems to be identical with the spirochaete of Panama relapsing fever.

The infection was successfully transmitted to white mice, rats, a guineapig, white-faced monkeys (*Cebus capucinus imitator*), red spider monkeys (*Ateles geoffroyi*), a night monkey (*Aotus zonalis*), and to numerous other squirrel monkeys. It soon disappears from the blood in all these animals except mice, rats and young squirrel monkeys, the latter generally succumbing to the infection.

Two human volunteers were inoculated with blood from an infected monkey and both developed attacks of relapsing fever. From one case the infection was passed back into a clean squirrel monkey and from the other into three more volunteers, all of whom became infected, although one failed to show spirochaetes in the blood, in spite of a severe febrile reaction, but recovered promptly after an injection of neoarsphenamine.

Another man was infected by the bites of 31 nymphal and adult ticks, *Ornithodoros venezuelensis*, that had fed on an infected monkey about five weeks previously. This subject also failed to show spirochaetes, but a squirrel monkey inoculated with 1 cc. of his blood collected during the first febrile attack, showed spirochaetes 6 days later and died of the disease 31 days later. A batch of 60 larval ticks, that had been reared from adults fed on an infected monkey, were allowed to bite a human volunteer, who showed no signs of infection, either clinical or microscopic, during the succeeding five weeks he was under observation. Attempts were made to cultivate the spirochaetes in ascitic agar, and rabbit serum medium, but with negative results.

The authors also found spirochaetes in two opossums and two armadillos, and state that there is much to suggest that Panama relapsing fever is primarily a disease of animals rather than of man.

E. H.

KRITSCHESKI (I. L.) & DVOLAITSKAYA-BARISCHEWA (K. M.).

Ornithodoros papillipes als Ueberträger von Spirochäten des Rückfallfiebers unter experimentellen Bedingungen. [*O. papillipes* as the Carrier of Relapsing Fever Spirochaetes under Experimental Conditions.]—*Zent. f. Bakt.* I. Abt. Orig. 1931. Aug. 11. Vol. 121. No. 7/8. pp. 421–432. [14 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

A detailed record of transmission experiments with *Ornithodoros papillipes*, the natural carrier of *Spirochaeta usbekistanica*, with various

other strains of relapsing fever. The results show that both *S. recurrentis* and *S. marocana* (Berbera strain) can be transmitted to white mice by the bites of this tick, in addition to *S. usbekistanica*. Experiments with the Brazzaville strain of *S. duttoni* gave negative results. It is of interest that the authors used only adult ticks in all their experiments and therefore their results with *recurrentis* and *marocana* do not agree with the views of NICOLLE and his fellow-workers that *Ornithodoros* infected in the adult state do not transmit the infection by their bite, but have to become infected in the nymphal stage [see this *Bulletin*, Vol. 27, p. 109].

E. H.

KRITSCHESWSKI (I. L.) & BRUSSIN (A. M.). Ueber den Neurotropismus und die Salvarsanfestigkeit der Recurrensspirochäten. [**Neurotropism and Drug Resistance to Salvarsan in Relapsing Fever Spirochaetes.**]—*Arch. f. Dermat. u. Syph.* 1931. July 23. Vol. 163. No. 3. pp. 610–624. [32 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

KOLLE (W.), PRIGGE (R.) & ROTHERMUNDT (M.). Erwiderung zur vorstehenden Arbeit von I. L. Kritschewski und A. M. Brussin. [**A Reply to the Foregoing Paper.**]—*Ibid.* p. 625.

The first of these is a polemical article in which the authors stress at some length their view that various races of relapsing fever spirochaetes show varying degrees of neurotropism or somatropism. Some races such as the African strains are found to be highly neurotropic, whilst others, such as the Russian strains, are highly somatropic and very little neurotropic. All strains of relapsing fever are said to be potentially resistant to salvarsan, but different strains show various degrees of this potentiality.

In reply, the German authors point out that many of the Russian strains show little tendency to produce residual brain infections, and most of these strains are not resistant against salvarsan. In opposition to the views of the Russian workers, they are of the opinion that the persistence of spirochaetes in the central nervous system depends essentially on the degree of antibody formation, and not on any inherent neurotropic or somatropic properties. Those interested should consult the original articles.

E. H.

DELANOË (P.). Le chacal et le hérisson réservoirs du spirochète marocain, *Sp. hispanicum* var. *marocanum* Nicolle et Anderson, 1928. [**The Jackal and Hedgehog as Reservoirs of the Moroccan Spirochaete.**]—*C.R. Acad. Sci.* 1931. Sept. 14. Vol. 193. No. 11. pp. 450–452. [5 refs.]

Out of 11 young jackals, 9 were found to be spontaneously infected with this spirochaete, whilst two adults were not infected. However the serum of one of these latter contained immune bodies against the spirochaete. The infections in three of the young jackals lasted from 15 to 20 days after they were caught. There was no persistence of the virus in the brain.

Out of 17 hedgehogs, 7 were spontaneously infected as shown only by subinoculation into guineapigs.

Another insectivore, *Macroscelides rozeti*, var. *deserti*, was examined, but the inoculation of blood and nervous matter from 15 of these animals into guineapigs gave only negative results.

E. H.

RUBINSTEIN (P. L.) & KAPUSTO (M. L.). Ueber die Symbiose verschiedener Spirochätenarten des Rückfallfiebers und verschiedener Trypanosomenrassen bei Infektion. [**Mixed Infections of Various Species of Relapsing Fever Spirochaetes and of Races of Trypanosomes.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 72. No. 3/4. pp. 309–320. [6 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

An interesting study of mixed infections of *S. recurrentis*, *S. duttoni*, *S. marocana*, and also of two strains of *Trypanosoma brucei* in mice. The results indicate that when mice are inoculated simultaneously with the above three strains of relapsing fever, a new race of spirochaete is obtained, with antigenic properties different from those of *S. recurrentis*, *S. duttoni* and *S. marocana* respectively. In all cases the adhesion phenomenon was used, and the spirochaetes of this new race gave negative results with immune sera of the three original strains. This race remained constant for six passages in mice, but on the seventh passage the three original strains reappeared.

This new race was not simply a mixture of spirochaetes for it was passed through mice immunized against each of the three original strains and retained its antigenic properties.

When two races of *Trypanosoma brucei* were similarly inoculated simultaneously into mice, it was found that in contrast with the results recorded above, that there was a suppression of one of the races and the other persisted unchanged.

E. H.

LEVADITI (C.), MARIE (A.) & LÉPINE (P.). Mécanisme de l'immunité dans la fièvre récurrente de l'homme. [**The Immunity Mechanism in Human Relapsing Fever.**]—*C.R. Soc. Biol.* 1931. Nov. 13. Vol. 108. No. 32. pp. 659–663. With 3 charts in text. [7 refs.]

The authors have treated four cases of general paralysis by the intracerebral inoculation of the Brazzaville strain of *Spirochaeta duttoni*. The patients all showed a continuous fever, which lasted for about a month, and there was no evidence of any relapses. The blood contained spirochaetes and the cerebrospinal fluid was also virulent 34 days after the inoculation in one patient, and 9 and 25 days afterwards in another. One patient died of an intercurrent pulmonary infection; his brain showed signs of meningitis with large mononuclears, but no trace of spirochaetes, either *S. pallida* or *S. duttoni*. The other three patients all showed very marked improvement in their general condition, both physical and psychical.

Discussing these results the authors consider that the relapsing character of *S. duttoni* infection is due to two factors; one the immunity acquired by the host and the other the antibody resistance acquired by the spirochaetes. This immunity must be under the control of the nervous system, since it does not develop if the nervous centres are affected, functionally and anatomically, by a local infection.

E. H.

KALAJEW (A. W.). Ueber die Natur der Immunität bei Rückfallfieber. XIV. Der Einfluss der Ausschaltung des retikulo-endothelialen Systems aus dem dem Organismus auf die Erreger des Rückfallfieber bei Ratten. [**Nature of Immunity in Relapsing Fever.**—*Giorn. di Batteriol. e Immunol.* 1931. July. Vol. 7. No. 7. pp. 184–192. English summary.]

KRITSCHESKI (I. L.) & RUBINSTEIN (P. L.). Ueber die Natur der Immunität bei Rückfallfieber. XV. Ueber die Bedeutung des Retikuloendothelialsystems als einer Abwehrvorrichtung während erworbener Immunität bei Rückfallfieber.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 71. No. 3/4. pp. 372–382. [2 refs.] [Microbiol. Research Inst., Education Commissariat, Moscow.]

These two articles deal with continued research in Prof. Kritschewski's laboratory on the importance of the R.E. system in infections due to *S. duttoni*. (Previous abstracts, this *Bulletin*, 1928, Vol. 25, p. 406; 1929, Vol. 26, p. 420; 1930, Vol. 27, p. 577; 1931, Vol. 28, pp. 71, 854).

Kalajew finds that in the rat splenectomy leads to an enormous increase of spirochaetes in the peripheral blood-stream; in the terminal stages dense masses of organisms are visible with the low power of the microscope, a phenomenon hardly ever seen in the normal animal. As in the normal animal, destruction of spirochaetes occurs by lysis; phagocytosis is of minor importance. No lysis is seen in the brain tissues proper; he associates this finding with the absence of antibodies from the nervous system.

Kritschewski and Rubinstein study the protective functions of the R.E. in mice immune on account of a previous infection. Animals which 20 or 40 days previously had experienced not less than three relapses were subjected to splenectomy, with or without intensive blockade. On the day following splenectomy, and immediately after blockade, they were inoculated with a dose of spirochaetes many times the initial infecting dose. In no case did infection follow. As a more severe test the authors repeated the experiments with less highly immune mice, i.e., animals treated with salvarsan at earlier or later stages of the first attack. But now, in some cases, the second dose of spirochaetes by itself produced infection, and splenectomy, etc., had no greater influence in destroying resistance. At times splenectomy without reinfection also led to a relapse terminating fatally. Thus removal of a large part of the R.E. system does not abolish acquired immunity to *S. duttoni*. Either the immune animal is protected by some other cell system, or, after splenectomy combined with blockade, histiocytes not accessible to the investigator are sufficient to maintain immunity; the authors incline to the latter hypothesis.

E. Weston Hurst.

JAHNEL (Franz). Ueber das Verhalten der Geflügelspirochäten zum Zentralnervensystem. [**The Persistence of Fowl Spirochaetes in the Central Nervous System.**—*Ztschr. f. Hyg. u. Infektionskr.* 1931. Sept. 15. Vol. 112. No. 4. pp. 613–622. With 3 text figs. [12 refs.] [Kaiser Wilhelm Inst., Munich.]

It is well known that the fowl spirochaete can persist in the brains of fowls after their apparent recovery. The author injected infected fowls at

different stages of the disease with similar doses of neosalvarsan. Those injected when the spirochaetes first appeared in the circulation became completely negative, as tested by the inoculation into normal fowls of brain material, liver, spleen and blood, respectively. When birds were treated after the spirochaetes had become numerous they all showed residual brain infections. The author made sections of these brains and by using Jahnke's Pyridin-Uranium method was able to demonstrate the persistence of actual spirochaetes in both the white and gray substance of the brain.

E. H.

LANDAUER (F.). Etude du milieu dans lequel se cultive le spirochète des poules. [**A Study of Culture Media for the Fowl Spirochaete.**]—*C.R. Acad. Sci.* 1931. Aug. 3. Vol. 193. No. 5. pp. 301-302.

——. Sur la culture du spirochète des poules. [**The Culture of the Fowl Spirochaete.**]—*Ann. Inst. Pasteur.* 1931. Dec. Vol. 47. No. 6. pp. 667-679. [2 refs.]

The author, starting with Marchoux and Chorine's modification of Galloway's medium, after the tenth passage made further simplifications in the culture media without affecting the virulence of the spirochaetes, which at the 37th passage killed fowls in 5 days. As shown by MARCHOUX and CHORINE 9 per cent. dilution of egg albumen in physiological saline solution, used in this medium, contains a harmful substance which disappears after heating at 80° C. for 30 minutes. The resulting liquid after centrifuging is favourable for the growth of the organisms. The author finds that even after the complete precipitation of all albumens by heating with alcohol or acid, the liquid obtained after filtration favours the growth of spirochaetes. Moreover the ash of egg white is equally efficacious.

Similarly blood, necessary in the earlier passages, was successfully replaced by the products of dialysis through a collodion membrane. Although the fowl spirochaetes only grow under a plug of vaseline, they die if completely deprived of oxygen.

E. H.

LE CHUITON. Etude sur les fièvres récurrentes à spirochètes. A propos d'un cas de fièvre espagnole constatée en Tunisie. [**Studies on Relapsing Fever. A Case of Spanish Relapsing Fever observed in Tunis.**]—*Arch. Méd. et Pharm. Nav.* 1931. July-Aug.-Sept. Vol. 121. No. 3. pp. 357-367. With 1 text fig. [4 refs.]

A full account of a case observed by the author in Tunis.

E. H.

DU (S. D.). **A Simple and Rapid Method of staining Blood Spirochetes.**—*China Med. J.* 1931. July. Vol. 45. No. 7. pp. 657-658.

The author recommends the use of carbol fuchsin for one minute, after dehaemoglobinizing for 5 seconds with 6 per cent. acetic in 95 per cent. alcohol.

E. H.

PANAYOTATOU (Angelique). Quelques cas de bronchite à spirochètes de Castellani. [**Some Cases of Bronchial Spirochaetosis.**]—*Arch. Ital. Sci. Méd. Colon.* 1931. July 1. Vol. 12. No. 7. pp. 384-390. English summary (6 lines).

A description of four cases diagnosed as bronchial spirochaetosis, observed in Alexandria, Egypt, which all showed chronic symptoms with

a tendency to relapse, and the presence of spirochaetes in the sputum. The use of stovarsol for treatment gave satisfactory results.

E. H.

BLANCHARD (M). Les spirochétoses dans les problèmes d'hygiène coloniale.—*Marseille Méd.* 1931. May 25. Vol. 68. No. 15. pp. 653-668.

HIROKI (H.). A Contribution to the Understanding of Rieckenberg's Reaction on *Spirochaeta recurrentis*.—*Jl. Oriental Med.* 1931. Oct. Vol. 15. No. 4. [In Japanese. English summary p. 77.]

RAT-BITE FEVER.

KUIPERS (F. C.). Mededeeling over nog een geval van rattebeetziekte. [**Another Case of Rat-Bite Fever.**].—*Nederl. Tijdschr. v. Geneesk.* 1931. Feb. 7. 75th Year. 1st Half. No. 6. pp. 604-607. With 1 fig.

VEEN (H.). Rattebeetziekte (sodoku).—*Ibid.* pp. 608-613. With 1 fig. [8 refs.]

In the first communication there is described the third case in Northern Holland of rat-bite fever which has been observed by the author. The patient, a child, was bitten on the nose and hand. Two weeks later the child was suffering from fever, thickening of the nose and mucous discharge. The possibilities first considered were erysipelas of the face and diphtheria, but the true causation was established by the serum tests of lysis and agglutination. Blood culture was not successful. The child was treated by intramuscular injections of salvarsan—10, 20, 50 mgm. at weekly intervals and three of 75 mgm. at longer intervals. In spite of these, however, the temperature was more or less high for nearly 3 months.

In the second paper we have set out a very instructive case of primarily mistaken diagnosis. The patient had scratched his hand with a nail some 10 days previously, and appeared to be suffering from a consequent inflammatory reaction. It was not for some considerable time that the periodic character of the temperature curve and other symptoms, together with the discovery that the patient had been bitten by a rat, led to the diagnosis of rat-bite fever. This was confirmed by serum test. The symptoms of the patient before and after the diagnosis are fully described and the case is published more or less as a warning that such infection may be more frequent than is usually supposed.

W. F. Harvey.

DE ARAUJO (Eduardo). Diagnostico experimental de sodoco. [**The Experimental Diagnosis of Sodoku.**].—*Brasil-Medico.* 1931. Oct. 3. Vol. 45. No. 40. pp. 924-928. English summary.

The author inoculated mice from a suspected case of sodoku in Brazil, and subsequently made blood passages into young guineapigs which all showed *Spirillum minus* in the blood.

E. Hindle.

MISCELLANEOUS.

COLONIE DU CONGO BELGE. Rapport sur l'Hygiène Publique pendant l'année 1929. [**The Public Health in Belgian Congo, 1929.**] [TROLLI (G.).]—164 pp. With 8 plates (1 map) & 1 chart. 1931. Brussels. [20 frs.]

This report, by Dr. TROLLI, Médecin en Chef, consists of 65 large pages of text, 84 pages of tables and reports from four laboratories. It cannot be adequately presented here. The number of doctors in the service is now 122. There are also 96 private practitioners, and 19 in the service of protestant missions. It is noted that young Belgian doctors are being recruited in increasing numbers, but that they are not interested in laboratory work.

Europeans.—Of the 25,679 there died during the year 285 or 11·09 per mille. This is the lowest figure since the formation of the Colony, but it is pointed out that improvement of transport has led to easier repatriation. This figure is compared with that of French and British colonies in Tropical Africa and it is seen that the mortality is intermediate, greater than the British but less than the French. The number of births was 517, the deaths in the first twelve months 92, an infant mortality rate of 178; this is an increase over previous years; 34 per cent. of the European population are now women. The cause of death is known in less than half of the 285 deaths; the list is headed by malaria and blackwater fever. 83 Europeans were invalided and 23 definitely declared unfit for service. The cause was in 19 cases malaria, in 12 anaemia, in 22 neurasthenia and in 3 debility.

Natives.—The table shows the number treated over a series of years and the deaths.

		Treated.	Deaths.	Per mille.
1925	... ..	238,351	3,399	14·26
1926	... ..	239,670	4,904	20·46
1927	... ..	251,428	4,583	18·22
1928	... ..	246,938	3,614	14·63
1929	... ..	362,946	4,422	12·18

An equal number has been treated by the great commercial companies, the Red Cross and missionaries. A table shows that in the Leopoldville Urban District with a population of 47,500 the deaths were headed by pneumonia (230), dysentery (78), and tuberculosis (81).

Passing on to diseases treated we find 3,850 cases of *variola* with 37 deaths, nearly all in the Congo-Kasai region. Of *yellow fever* there was no case. An epidemic of *plague* discovered in 1928 near Lake Albert on the Uganda frontier lasted through 1929. Of 60 cases, 7 were bubonic, 12 septicaemic and 33 pulmonary; 8 were "undetermined." The cases occurred chiefly in the dry season when the nights were cold. No less than 200,000 rats have been captured; it is not stated whether they were examined for evidence of plague. *Cerebrospinal meningitis*, which was formerly epidemic at the Kilo-Moto mines, is no longer found, which the author attributes to vaccination; it still occurs elsewhere. Of *enteric fever* there were in natives

71 cases and 31 deaths, most of them in the Katanga province. A recent improvement in the figures is attributed to the inclusion of *Bact. paratyphosum C* in the vaccine used.

On the subject of *bacillary dysentery* the author writes that there is little of precision; the origin of these cases does not seem to have been satisfactorily determined. Two diseases with unfamiliar names are mentioned, *fare* and *bitutu*. *Fare*, or *kaki*, which occurs in the Ubangi district in epidemic form, is an inflammation, sometimes ulcerous, of the terminal portion of the intestine, often fatal [? resembles bicho of S. America]. *Bitutu*, found in the Congo-Kasai province, is an acute eruptive fever in children, confused by the natives with smallpox. The fever lasts several days and the rash consists of miliary papules most abundant on the face.

Malaria. Government doctors treated 1,508 cases in Europeans with 12 deaths. Anaemia and neurasthenia, which are increasing in frequency, are in many instances due to malaria, and it is noted that these are the chief causes of invaliding. Figures are given also for natives. Of *blackwater* there were in Europeans 86 cases with 15 deaths.

Trypanosomiasis. On this disease there is a mass of detailed information. The number of Europeans treated was 21 against 12, 14 and 8 in 1928, 27 and 25; no death has occurred in this period [? in the Colony]. The vast extent of the problem in natives is seen in the statement that 2,383,892 natives were examined among whom 27,046 new and 50,244 old infections were found. No case of *T. rhodesiense* infection was diagnosed. The author pays a well-deserved tribute to the handful of doctors engaged in this work often under the most unfavourable conditions. Such good results as have been obtained in treatment are due largely to the general use of tryparsamide.

Tuberculosis. Since 1918 it has been obligatory on Europeans entering the colony to produce a medical certificate of freedom from this infection, and for Europeans developing infection therein to leave it. In this year there were 38 cases in Europeans and 471 in natives, of which 396 were pulmonary. All these diagnoses were made in persons attending hospital or dispensary.

Of *pneumonia* 4,356 cases were recorded with fatality ranging from 15 per cent. in the Oriental province to 34 in the Katanga, or for the whole 21.3 per cent. A vaccine is put out from the Leopoldville laboratory but there are no reports on its use.

Syphilis is increasing in the Oriental province both in Europeans and natives, especially along the Congo-Nile road; 9,335 cases were recorded in natives. A few cases of general paralysis and other nervous complications are reported. Of *yaws* 88,930 cases were treated by the Government doctors. This disease must be declared and no charge is permitted to be made for the drugs employed in treatment. Few natives submit to complete courses. The Government doctors have treated 1,609 cases of *leprosy* and the Red Cross 1,016.

Relapsing fever. The distribution is mapped out in some detail. Relapsing fever and *ornithodoros*, the author writes, seem to be absent to the north of the 7th degree of S. latitude and between the 15th and 25th meridians. In one region of 5,022 persons examined 62 per cent. had *goitre*. In other regions the disease exists in less proportion. Iodized salt is being supplied to traders to be sold at the same price as ordinary salt, and in substitution for it. Among the natives there were 2,695 cases of *amoebic dysentery* with 225 deaths (8.3 per cent.),

39 of liver abscess and 106 " other forms " of hepatitis with 30 deaths ; what the nature of these last is the author does not know.

After a few remarks on ankylostomiasis which was reported to have caused 203 deaths in natives the author goes on to *bilharziasis* which appears to be increasing in the Colony. In Katanga it is according to VAN HOOFF " un véritable fléau " ; it is both vesical and intestinal and is met with equally in the centres and in the bush ; 2,199 cases were reported, 984 from Katanga with 73 deaths. The author believes that *mental* and *nervous diseases* are increasing. In this year, trypanosomiasis excluded, there were 199 cases of insanity in natives, cerebral diseases 407, epilepsy 171, other nervous diseases 339. These cases occurred not in the villages, but at centres such is Leopoldville and Stanleyville. A case of *kala azar* was reported but, the author notes, without laboratory confirmation.

There are *schools for native assistants* at Boma, Leopoldville, Coquilhatville, Stanleyville and Elisabethville, the doings at which are briefly chronicled. Most are associated with laboratory or hospital. The author recommends the type which is independent and directed by a European of the medical service, who teaches the theoretical courses in a school *ad hoc* and looks after discipline of the pupils in a special " camp." He thinks the courses should be less theoretical and more practical than at present.

In a report drawn up in collaboration with Dr. REPETTO, Médecin hygiéniste inspecteur, the author says that we are not sufficiently informed on the real morbidity and mortality of labour in the Congo ; statistics and accurate reports are needed. The physical aptitude of the workers is at the root of the problem. We must know the proportion of fit and healthy men in the various tribes and in this connexion he discusses the Pignet index. A mission was to cover this field in 1930, to study the relation between variations in this index and the endemic diseases of different regions, and the various diets. We know nothing of the resistance of the black to fatigue and overstrain. Can he work 8 hours consecutively without training? Some companies have imposed rules of hygiene even stricter than those of the State. The author instances the Union Minière and cites its mortality figures over a series of years [given elsewhere]. The Médecin en Chef of that Company does not think that the mortality can be got below 20 per mille, but Dr. Trolli looks forward to a future record of 10 per mille.

A. G. B.

- i. MOTTOULLE (L.). L'organisation du service médical et la situation sanitaire générale à l'Union Minière du Haut-Katanga fin 1929. [**Organization of Medical Service and the Hygiene of Union Minière du Haut-Katanga, 1929.**—*Ann. Soc. Belge de Méd. Trop.* 1931. June 31. Vol. 11. No. 2. pp. 219-255. With 2 text figs.]
- ii. VAN NITSSEN (R.). Notes sur la pathologie du noir dans les camps industriels de l'Union Minière du Haut-Katanga en 1930. [**Pathology of the Natives in the Industrial Camps of the Union Minière, 1930.**—*Bruxelles-Méd.* 1931. Nov. 8 & 15. Vol. 11. Nos. 2 & 3. pp. 31-45 ; 67-75. With 2 figs. [18 refs.]

i. *Europeans*—This large mining company in the year under review had an average personnel of 3,484 Europeans—2,261 employees, 739 women and 485 children. The general mortality was 7·17 per mille ; for the preceding 3 years it was 8·9, 9·8, 7·8. The population, which in

the last year had increased by 1,000, is young and selected. As to disease, the most serious from all aspects were affections of the respiratory tract including influenza, malaria and affections of the digestive tract. The malarial incidence was 40·8 per cent. ; blackwater was seen 4 times. No amoebae, schistosoma or balantidium were seen in dysenteric stools, but a variety of bacilli which are named. Enteric fever has been almost eliminated by systematic vaccination with T.A.B. of all the personnel in, or proceeding to the Katanga. Since the appearance of paratyphoid C at the end of 1928 this bacillus has been included with the other strains in the vaccine. During the year 18 of the personnel were invalided home, 5 for psychical and mental symptoms.

Natives—The native employees numbered 17,257, of whom 11,440 were single and 5,817 married with 3,149 children. Besides these, there were 9,800 recruits undergoing "medical preparation" with 2,508 women and 1,318 children.

The table shows the mortality by diseases for three years.

TABLE III.

Mortality by disease among the Union Minière labourers of the industrial camps (accidents excluded).

Effective total : 17,257.

Disease.	Number of deaths.	Mortality per mille per annum.		
		1927.	1928.	1929.
Pneumococcus Infections	273	22·10	15·38	15·82
Typhoid fever	1	7·03	3·58	0·06
Paratyphoid " C "	1	—	0·20	0·06
Tuberculosis	11	1·30	1·37	0·64
Dysentery	37	5·67	3·65	2·14
Epidemic cerebrospinal meningitis	14	3·40	1·43	0·81
Bilharziasis	1	0·12	0·20	0·06
Variola	1	—	0·06	—
Miscellaneous	42	3·54	2·28	2·43
Total	381	43·16	28·15	22·02

The author does not think that the mortality figure can be reduced from the present 22·02 below 20 per mille. Pneumonia is still the principal factor ; it caused 67·9 per cent. of the total number of deaths. This percentage was in 1927 48·7 and in 1928 52·2 ; the progressive rise is due to the reduction of other causes of mortality such as enteric, meningitis and the dysenteries. The mortality among the 5,817 women was 17·02 per mille, also an improvement on past years, which shows, in the author's opinion, that the improvement is due not so much to amelioration of the conditions of work as that of housing, clothing and diet ; in women pneumonia, dysentery, tuberculosis head the list as causes of death. As regards the children there has been in all the camps since 1924 an *Oeuvre de Protection de l'Enfance Noire*, or O.P.E.N. Prior to that date the infant mortality reached 50 per cent. The O.P.E.N. reinforces the diet during pregnancy and suckling, treats chronic infections of the mother such as malaria, syphilis and

yaws, prevents V.D. by importation of families to diminish prostitution, and educates the mothers in the care of their children. Mothers and pregnant women in the camps have a special ration, a premium at birth and an outfit for the baby. All native women who are pregnant have a B.W. test and treatment if necessary. Table V is of interest as showing the steady increase in the number of married employees, and in the children born.

TABLE V.

Birth Rates Comparison by Years, Union Minière Camps.

	1924.	1925.	1926	1927.	1928.	1929.
Effective average of labourers	12,111	13,849	13,275	15,476	15,345	17,257
Effective average of families	1,793	2,506	2,940	3,662	4,702	5,817
Percentage of families	14.80	18.10	22.15	24.66	30.64	33.71
Number of births per year (still-births included)	124	237	331	522	680	887
Births per 1,000 families per annum	69.2	94.6	112.6	142.5	144.6	152.5

The infant mortality seems to have been 315 per mille "which is not very different from that of the poor class in France in 1925."

As to the recruits in the special camps the mortality varied with the race, from nil in the Rhodesians to 45 per mille among the Ruanda-Urundi [actual figures not given]; this race, however, once the period of "medical preparation" is over, is very resistant to climate and gives a good return of work. The most frequent causes of death amongst them are dysentery and paratyphoid C, both of which are being energetically combated.

The principal diseases of native employees are then discussed. The *pneumococcal group* is the most important, but ground is being gained by special measures of hygiene such as the suppression of common dormitories, the establishment of separate dwellings and the lessening of crowds for roll call and distribution of food. The mortality is now half what it was four years ago. The author notes that the mortality of volunteers from pneumonia is only a third of that of the recruits [again actual figures are not given], that the susceptibility varies with the tribe (Oriental province 39 per mille, Ruanda-Urundi 5 per mille), that women are less susceptible than men, and that "every old negro dies of pneumonia." The measures taken to decrease pneumonia are detailed; many have already been mentioned.

Of *tuberculosis* there were 23 cases and 20 deaths. The author has not yet tried B.C.G. vaccine, "our native population being already submitted to so much vaccination of every kind." Amoebic dysentery is uncommon, schistosomal dysentery is more frequent, 156 cases. Of bacillary dysentery 8 groups of bacillary agents are listed (500 stool cultures) by far the commonest being "coli, paracoli and Friedlander." By far the majority of the sufferers are of the Ruanda-Urundi tribe. Fevers of the enteric group have rapidly diminished since the general use of antityphoid vaccine. The laboratory furnished in 1929 331,161 cc. of T.A.B.C. vaccine. The population is revaccinated yearly. Epidemic cerebrospinal meningitis is discussed, with tables. The author

concludes that antimentingococcus vaccination well carried out has the same prophylactic value as antityphoid or antivariola vaccination and that the complete extirpation of the infection should be aimed at. Tick fever is rare in the industrial camps, but more frequent in the camps of preparation; infection is especially acquired on the roads which lead from Rhodesia.

The incidence of *malaria* has risen, from 2,395 admitted to hospital in 1928 to 3,857; this rise is attributed to the Ruanda-Urundi. This tribe again harbours the greatest number and variety of worms; ankylostomiasis is the most frequent form but is rarely severe. Tropical ulcers have become rare; they are systematically sought for and every wound is dressed immediately; this is the duty of a native infirmier.

An account is given of the 8,952 examinations made in the laboratory and a list of the 16 vaccines and serums manufactured.

The medical service now consists of 95 Europeans, 28 of whom are medical men, and 900 natives; there are 19 hospitals with 1,500 beds.

ii. This paper covers the same ground, the statistics being for the following year. The author notes that in the last twenty years natives have been drawn to this corner of the Katanga from all over Tropical Africa, including N. Rhodesia, Nyasaland and Angola. They stay from 6 months to 3 years or longer. There are now 16,000. He claims that the organization of these camps has reached a degree of perfection rarely attained in the Tropics.

Malaria. The natives of Ruanda-Urundi are very susceptible; they get attacks comparable with those of Europeans. Cerebral forms are not rare and many cases of blackwater fever have been reported amongst them; LECLEF has described 9 seen in 7 months.* The author supposes that the form of malaria in Katanga is different from that in their own country [an explanation which seems inadequate]. Acclimatization takes three years. Antilarval measures against the mosquito vectors *A. costalis* and *A. funestus* are the only practicable means of prevention.

Pneumonia was, as always, the gravest affection. The small susceptibility of the Ruanda-Urundi natives was again noted. The Katanga climate differs little from their own, whereas to the Rhodesian and the Lomani native it is cold—a possible explanation. The author says that contracts of long duration, 3 years at least, would do more to lessen pneumonia than all the prophylactic measures known; it is mostly acquired in the first year. Discussing the influence of season he notes that at each introduction into a camp of a caravan of recruits the incidence of pneumonia rises. Preventive vaccination, begun in 1919, was discontinued except for the Rhodesians in 1924 and for them too in 1930. The author notes the differences of opinion in S. Africa on this subject.† Such measures as the distribution of warm clothing, hot food and drink in the work places, the obligatory notification of cases followed by disinfection of house and garments and, especially, the measures against overcrowding have, in the author's opinion, contributed largely to the diminution of pneumonia in the camps, but these measures will never extirpate it. The percentage of mortality goes down each year. In 1930 the incidence was 60·4 per mille, and the deaths 10·5 per mille of labourers.

* *Bull. Méd. du Katanga.* 1931, No. 1, p. 19.

† See below, p. 241.

In spite of the great susceptibility of the black to *tuberculosis* the incidence in the camps goes down yearly. In this year there were 12 cases or 0·73 per 1,000 labourers. In 148 autopsies made in 1920-28 the organs were found affected thus:—

Lungs	118 times	Peritoneum	6 times
Spleen	36 "	Mesentery	3 "
Liver	30 "	Meninges	2 "
Intestines	23 "	Pancreas	2 "
Kidneys	14 "	Bladder	1 "
Pericardium	12 "		

In most instances several organs were attacked.

Under *intestinal affections* the author discusses the helminth infestations of the three tribes mentioned. In the Rhodesians the order of frequency is:

ankylostome, ascaris, strongyloides; in the Congolese

ankylostome, strongyloides, trichuris; in the Ruanda-Urundi

trichuris, ascaris, ankylostome [see this *Bulletin*, Vol. 28, pp. 763-4].

The author notes that carbon tetrachloride would be of value in the first two, but of questionable use for the Ruanda-Urundi.

The following measures were employed for *bacillary dysentery*—campaigns against flies with fly traps, systematic clearing round camps, preparation of food in a kitchen supervised by a European, common refectories, notification of cases followed by hospitalization and disinfection of dwellings and garments. The incidence of bacillary dysentery fell rapidly from 6 per cent. in June to 0 in December. [But this disappearance hardly bears the author's interpretation.] In 724 cultures from faeces there have been identified 49 times *Shiga bacilli*, 52 *Flexner-Hiss-Y-Strong*, 24 *Kruse E* (*Sonne 3*), 44 *Morgan*, and 91 *Castellani* (*Salmonella asiaticus*).

Amoebic dysentery is a rarity in the Lomami natives and the Rhodesians, but relatively frequent in the Ruanda-Urundi; e.g., it was found 178 times in the last as against 5 each in the other two. All were imported cases. *Schistosomiasis* (*mansoni*) is frequent in natives with and without symptoms. This again is an imported disease. It is common in the Lomami (13·1 per cent.), rare in the Rhodesian (3·35 per cent.) and only exceptional in the Ruanda-Urundi (0·65 per cent.). [Unfortunately, figures of the actual numbers of the respective tribes are wanting.] Of 685 who were positive on examination only 185 had symptoms.

Grave ulcerative colitis of uncertain nature is found in the camps. It is perhaps a sequel of bacillary dysentery and the author notes that administration of antidysentery serum is often of benefit.

Enteric fever, which in 1926 and 1927 had affected 16 and 14 per mille of the labour force, in 1930 fell to nil, except a few cases in women and children, whom it is not possible to vaccinate as thoroughly. The fatality of this disease in the native is 40-60 per cent. The vaccine now consists of typhoid 1,000 millions, para A and B of each 250 millions, C 500 millions. Paratyphoid C, which was epidemic and severe among the Ruanda-Urundi in 1929, has now disappeared [see LEWILLON, this *Bulletin*, Vol. 28, p. 42].

Of the eruptive fevers *measles* calls for some notice. This year 102 men, 97 women and 371 children had attacks, preceded by conjunctivitis. Twenty-three deaths occurred in children, or 6·2 per cent. Measles is a frequent cause of broncho-pneumonia and is a serious disease in the black child.

Tick fever (relapsing fever) is endemic in Katanga but, since the beaten earth of the huts was replaced by cement floors, has given little trouble.

Cerebrospinal meningitis was epidemic in 1925 (172 cases). All the population was then vaccinated with a vaccine prepared from local strains, and in 1930 5 cases only were reported. Vaccination is renewed yearly. The author, however, attributes the improvement to the hygienic measures taken rather than to vaccination.

Venereal Diseases. It is untrue, the author says, that *syphilis* is widespread in the Congo. In 1930 63 men, 91 women and 22 children were treated in the camps, i.e., 1·6 per 1,000 persons. There is no concealment. It is mild; the author has never seen visceral lesions or tabes or G.P. *Gonorrhoea* is common and more difficult to cure. *Yaws* is not a Katanga problem. It is found only in a few villages far from the camps. The cases treated are late cases which are not infective, mainly in adults.

The remainder of the paper is concerned with vital statistics. One notes that the general mortality of the native employees, 22·02 per mille in 1929, was this year reduced to 16·28.

A. G. B.

VAN CAMPENHOUT (J.). Considérations sur l'utilisation de la main-d'oeuvre au Congo Belge. [**The Employment of Labour in Belgian Congo.**—*Bull. Office Internat. d'Hyg. Publique*. 1931. Sept. Vol. 23. No. 9. pp. 1627–1651. With 1 fig. [3 refs.]]

On the question of the availability of labour in reference to distance the Congo Government authorizes the employment of 2·5 per cent. of the population for work at a distance and 3·75 per cent. for work on the spot, i.e., less than 6 kilometres away. Recruiting is performed by Labour Offices which follow the labourer through his career, recruiting him with medical selection, transporting him, acclimatizing and training him for work, exercising surveillance over him in his job, and finally sending him home or “stabilizing” him; these stages are schematically illustrated. The recruit has three medical examinations, one in his home or district, a second when he reaches his destination and a third when he passes to his employer. Various measurements and “indices” are discussed, for the guidance of the recruiting agents and doctors. Rules are laid down for the marches when transport cannot be obtained; 30 kilometres is given as the maximum distance for the day. Arrived at his destination the recruit is kept in camp for 14 to 28 days. For the first week he rests, has a copious diet, and a medical examination. Vaccination, jennerian, anti-enteric, anti-meningococcal, is begun, as well as an anthelmintic course. Exercises to improve the physique are practised in some camps. Before repatriation a medical visit is obligatory.

For sickness due to work and not to any fault of the employer compensation is given on a scale, without specific enquiry; such sums are usually squandered by the beneficiaries. The ration which was in force in Katanga up to 1930 is given; it consisted of manioc, maize or rice; bean or peas; ground nuts, oil or animal fat; vegetables or fruit; meat, fresh or chilled, or fish; and salt, and was equivalent to 4,050 calories daily. The present ration gives 3,545 calories. The mode of distribution of the ration is discussed. Vital statistics are given for the Katanga province, Congo-Kasai, Equator, and Eastern Provinces,

for 1927 to 1929, and the chief causes of mortality in the Katanga are discussed.

In support of the statement that the mortality is greatest in the first months we are told that of 244 deaths in the Katanga, 107 took place in the first 6 months, 94 in the 2nd 6 months, and 38 after a year. It is now proposed to recruit for a minimum period of 3 years, to facilitate marriage, give in whole or part the usual marriage gift, allow holidays, increase wages with period of service and provide comfortable quarters. As a result of an enquiry made by the Comité Consultatif de la Main d'Oeuvre Indigène the Committee recommends the recruitment of adult healthy men up to 10 per cent. and that in a total of 75 persons, women, children and infirm, there should be at least 23 men.

A. G. B.

DARDENNE. **The Red Cross in the Congo.**—*Rev. & Information Bull. League of Red Cross Soc.* 1931. July. Vol. 12. No. 7. pp. 235–239.

The Directress of the Congo Red Cross reports that in 1929 the Society expended nearly two million francs on medical relief to natives. It establishes hospitals and clinics, trains native nurses and midwives, provides popular health instruction and combats leprosy, venereal disease and tuberculosis. There are three medical units, each composed of a main hospital and dispensary with branch dispensaries at a distance of three days' march. They are situate in the Uele-Nepoko region of the Eastern Province where is a population of some 320,000. The best organized unit, formed in 1925 in Pawa, consists of two hospitals, for whites and natives respectively, a dispensary with laboratory for research, a maternity home, a tuberculosis village with 24 huts, a leper settlement with 160 huts, a school for native male and female nurses and a hostel for patients from a distance. The native hospital contains 45 beds. The monthly average of deliveries is 12–14. In the school for native male nurses there are 30; they live in, receive a monthly wage, wear Red Cross uniform, and remain for 3 years. Several "excel in microscopical work." Details are given of the campaign against leprosy; during 1930, 359 lepers were cared for and treated in the Pawa area.

There are also local committees in the chief towns. At Leopoldville an anti-venereal clinic has been opened for natives; in Katanga a leper settlement is maintained; at Wendji a dispensary and baby clinic.

The Congo Red Cross is to be congratulated on its activities.

A. G. B.

LASNET. Le programme de développement sanitaire aux colonies et les grands emprunts coloniaux. [**Program of Public Health Development in the French Colonies in reference to Colonial Loans.**]—*Rev. d' Hyg. et de Méd. Préventive.* 1931. July. Vol. 53. No. 7. pp. 481–502.

The French Parliament has approved the provision of large loans to the French Colonies, a percentage of which (457 million francs) is to be devoted to hygiene and public health. It was decided that no

public work should be commenced till measures had been taken to protect the health of the workers, and the Chamber voted 375 million francs for this purpose. Of this sum, 35 millions will be devoted to general measures and 340 millions to special or local measures. Among general measures are the organization of a mobile medical inspection of labour, the training of civilian doctors in a School to be created, enlargement of the School of colonial military medicine at Marseilles, subvention to the Institute of Hygiene of the Faculty of Medicine of Paris, subvention to the Institute of Colonial Medicine at Marseilles, creation at the Pasteur Institute, Paris, of a laboratory to be a centre of instruction and research in tropical medicine, subvention to the Institut Lannelongue for the training of visiting infirmières, creation of a colonial hospital at Marseilles; 20 millions are to be provided for the last object. Details, too full to quote, are given of the local measures which are to be applied throughout the French colonies.

A. G. B.

HERMANT. Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat pendant l'année 1928. [**Transmissible Diseases in the French Colonies and Mandated Territories in the Year 1928.**].—*Ann. de Méd. et de Pharm. Colon.* 1931. Jan.-Feb.-Mar. Vol. 29. No. 1. pp. 5-138. [1 ref.]

This long report, which reaches the public somewhat late, cannot be fully reviewed but some matters of interest are here noted:

Plague. In French West Africa of 707,136 persons 116,642 received lipo-vaccine. The people welcomed it and it has the advantage of needing only one administration. Its price is somewhat high and there are no data of its efficacy nor of the duration of the immunity conferred, but this is considered to be a few months. In Madagascar on the other hand an aqueous vaccine was used, 400,000 vaccinations.

Cholera. In Indo-China there were 4,440,884 vaccinations (agar cultures in saline heated to 57° C., two injections). The former desire of the population for this means of protection is now cooling, as is also the confidence which the sanitary personnel had in it. The systematic vaccination of bodies of persons under control—troops, schools, prisons—will be continued and eventually will provide a measure of its value.

Yellow Fever. In this year 3 cases only were reported on the Ivory Coast and 3 in Dahomey.

Typhus. This disease was reported for the first time in French West Africa from Upper Volta, the diagnosis being confirmed by a doctor with experience in North Africa. It was believed to have been imported by troops coming from Morocco.

Smallpox. Discussing vaccination the author notes that in regions where the total number of vaccinations has for some years exceeded that of the population, cases and even epidemics continue to arise; this he attributes partly to reduced activity of the vaccine and partly to the fact that many revaccinations are of people who do not need it while the non-vaccinated escape.

Malaria. In Indo-China the government favours the use of quinine and supplies it at under cost price. Its sale is controlled, however, by the customs officials, the psychological effect of which is that the sale is hindered, for the people do not love the customs. *Cinchona ledgeriana* has been cultivated successfully in S. Annam since 1923.

The proportion of quinine in the bark reaches 10 per cent. and other varieties with bark rich in other alkaloids are equally successful. The author notes the freedom of New Caledonia from malaria; carriers of plasmodia are freely introduced and a complete entomological study of the mosquito fauna is advised.

Dysenteries. In Indo-China 9,700 cases were treated with 500 deaths. From the fact that the affection is almost always curable by emetine with arsenicals it is regarded as amoebic. Similarly in the French establishments in India the amoebic form is believed to prevail. The dysentery prevalent in Madagascar has been shown by THIROUX to be bacillary.

Sleeping Sickness. Full data are given from all the African colonies. The magnitude of the French problem is shown by the statement that in Cameroon of 752,000 inhabitants, 663,000 were examined and 115,000 or 17.4 per cent. found to be infected.

Relapsing Fever. This disease has almost disappeared from Indo-China where 20 years ago it produced murderous epidemics. In French Equatorial Africa it is decreasing in frequency.

Intestinal Parasites. The author contrasts the activity of the Anglo-Saxons, supported by the Rockefeller Foundation, against intestinal parasitism, especially hookworm and the slight attention paid to it in the French colonies. He describes and commends the methods of the International Health Division.

Phagedaenic Ulcer. The author realizes the enormous economic losses entailed in the tropics from this affection. The supply of boots, gaiters, etc., to natives whose work subjects them to small injuries is, he says, every bit as necessary as that of quinine and mosquito net in malarious regions. Its importance will not be realized till it is added to the list of occupational diseases and accidents.

Beriberi occurred almost exclusively in Cochin China among coolies imported from Annam or Tonking for the plantations. The cases have trebled since 1916 (988 and 3,425). The quality of rice has now been laid down by the Governor and improvement is expected.

Pneumonia. The severity and severe losses occasioned by the pneumococcus, especially in Africa are noted. Incidentally we learn that in several British Colonies in Melanesia the wearing of clothing covering the chest is interdicted.

Trachoma is found in Mauritania, in Upper Volta (1,199 cases), in French Sudan (2,578 cases). It is not reported from the other French African colonies suggesting that the disease decreases in incidence with distance from Northern Africa. The author notes that whereas the Sahara was formerly an absolute barrier it is ceasing to become so, and intercontamination is likely to follow.

Rabies. The French have always been to the front in the provision of antirabic institutes. They are Saigon (instituted 1890), Hanoi (1898), Hué (1912), Vientiane (1924) in Indo-China; Dakar (1913), Brazzaville (1926) in Africa, and a secondary centre at Bamako, which receives spinal cords from Dakar once a fortnight; Antananarivo in Madagascar. At Dakar 88 persons were treated in 1927, and 49 in 1928 (one from Nigeria).

Venereal Diseases. In Indo-China these take the second place in importance after malaria; figures are given. The practical absence of syphilis in New Caledonia and New Hebrides is compared with its similar absence in Fiji, Solomons, New Guinea, where the immunity is considered to be due to the wide distribution of yaws; and the question

is raised whether the complete treatment of yaws in the Pacific will not suppress or reduce this immunity.

Tuberculosis. Under this head figures are given of BCG vaccinations. These were as follows:—

Country.	1928.	In all.
Indo-China	27,187	70,788
Madagascar	2,169	3,848
French West Africa	721	1,980

Figures are given of subsequent histories but it is admitted that satisfactory evidence of benefit is not easy to obtain. Tuberculosis in French West Africa is partly due to infected native soldiers repatriated from France. Careful watch is now kept in France for early signs, the patient is promptly repatriated whatever the season, and whereas formerly the ultimate result was death, there is evidence from Guinea to the effect that some make a complete recovery, showing, as the author says, that for natives return to their homes is more efficacious than any form of treatment.

A. G. B.

BAUVALLET (H.). Résultats d'une enquête démographique dans le Bas-Dahomey. [**Results of a Statistical Inquiry in Lower Dahomey.**—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 604–608.

In order to obtain accurate figures of the births and infant mortality of the district the author interrogated 224 Yoruba women between 18 and 45 years who came to consult him for various reasons at Porto-Novo. All had an ardent desire to have children, because sterility entails repudiation or divorce. They were asked—How many living children have you? How many living children have you born? How many children born alive have you lost before they were 12 months old? There was no reason for concealment. The results are tabulated. The 224 women possessed 476 living children, or 2·12 per woman; only 2 were sterile. They had born 620 or 2·76 per woman. Of the 144 children who were dead, 39 died in the first year; the infantile mortality figure was therefore 62 per mille. This, as the author says, must be regarded as very satisfactory. The two chief causes of death of infants are intestinal parasitism and umbilical tetanus, both avoidable. The mothers are described as excellent; they suckle their babies for 18 months. There is need for visiting infirmières to teach them cleanliness.

A. G. B.

LEFROU (G.). Comment déterminer l'âge des recrues en Afrique. Importance de la chronologie des dents de sagesse chez les Indigènes. [**Determination of the Age of Recruits in Africa. Eruption of Wisdom Teeth in Natives.**—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 595–604. [3 refs.]

When soldiers or labourers destined for work at a distance are recruited, it is necessary to select only adults who have completed their growth. At present a rough estimate of age is formed and the doctor

who afterwards takes them over has often to discharge many as too young and these may have a long journey to regain their own country. Adult age is reached when the epiphyses of the long bones join and this occurs in Europe at the age of 21. The eruption of the 3rd molars or wisdom teeth ought to coincide with the attainment of adult age, but racial characters differ. In whites the date of eruption is very variable, 10 per cent. of persons have only 28 teeth throughout life, and in nearly 20 per cent. the wisdom teeth are lacking in the lower jaw. In blacks on the other hand, the wisdom teeth erupt early, but the age has not been accurately determined. This difference is due to anatomical differences in the jaws of the races: moreover the third molar is larger in the negro than in the European, and has four cusps instead of three.

The author obtained data of recruits examined by the Council of Revision. Of 25 known to be 22 years and 33 known to be 21, only one had no wisdom teeth, whereas of 178 aged 20, 25 were without these teeth, 9 had one erupted, 26 had two, 19 had three and 99 four. Of the 25 without wisdom teeth 3 only were accepted for service, and this on grounds other than examination of the mouth. Of the 9 with one wisdom tooth, 3 were taken. The others were rejected for feebleness of constitution, or insufficient development. It follows that recruiting commissions should systematically refuse subjects without wisdom teeth.

Another table is given of the boys at the St. Louis schools the ages of whom are known, showing as before the number examined and the numbers with 4, 3, 2, 1 and 0 wisdom teeth for ages from 16 to 21. These accorded with expectation except at one school where these teeth had erupted in several boys at the reputed ages of 16 and 17. Here it was ascertained that to obtain admission a false declaration had been made and the real ages accorded with the teeth.

The author makes the following propositions:—

In the black the wisdom teeth erupt normally at 18–20 years, usually beginning with those of the lower jaw.

A native aged 16 has, as a rule, no wisdom teeth.

A native with 4 wisdom teeth is usually at least 18.

A native with no wisdom teeth is usually less than 21 and in half the cases less than 18.

Inspectors of labour have now a means of controlling the age of labourers.

[It should be easy to confirm or refute these observations.]

A. G. B.

KHARTOUM. The Kitchener School of Medicine, Khartoum. Third Report, 1928-1930 [ATKEY (O. F. H.).—73 pp. With 5 plates.

This consists of a résumé of the two previous reports [see this *Bulletin*, Vol. 24, p. 54; Vol. 25, p. 1004], report for the years 1928–29–30 and a number of appendices, chiefly assessors' reports on examinations. Dr. Atkey writes:—

“ These three years have constituted a period of steady progress. Twelve additional students have graduated during this time, seven in 1928 and five in 1930.

“ Thus nineteen Sudanese doctors are now carrying out medical work in the Sudan, fourteen as Sudanese medical officers and five as house-surgeons and house-physicians on probation. In every case they are carrying on work which was formerly carried on by Syrian medical officers.

"The positions of trust and respect that have been achieved by these Sudanese medical officers and the useful, honourable and prosperous careers which lie open before them have not failed to make an impression on the students at the Gordon College and, while during the years 1926 to 1929 some difficulty was encountered in getting the best type of student to enter the School of Medicine, there now seems to be little doubt that, in future, the most promising students will come forward for this work.

"The establishment of classes in Chemistry and Biology at the Gordon College in 1926 has been of great assistance in enabling a more thorough grounding to be given in these two most important subjects during the first year at the School of Medicine."

* * * *

"During the first two years the scheme and methods of teaching were, of necessity, largely experimental, but now a system of teaching has been developed that appears to be suitable to the nature and attainments of the students.

"The earlier students entered the school with no local tradition of conduct or work to guide them. It is believed that such a tradition is forming and that an atmosphere resulting from trust and confidence in their teachers and a realisation of the necessity for complete frankness and intellectual honesty is being established. This is indicated in the Assessors' report for 1930.

"The Assessors, in their report for 1927, recommend the establishment of a Graphic Museum similar to that existing at the Bureau of Tropical Research in Endsleigh Gardens."

* * * *

"The great difficulty experienced in teaching Arabs is to prevent verbal memorisation and to teach them to translate what they read into visual images. This comes so easily to a European child, who has looked at picture books since he was four years old, that it is very difficult for the European to realise to what extent an Arab is handicapped in this respect. The remedy is to teach more with the eyes and less with words and, for this reason, a Graphic Museum is essential for the proper tuition of Arabs. The Government is unable to undertake the construction and installation of such a museum at the present time, but it is hoped that some benefactor who is interested in this work will see his way to provide the necessary funds."

The Khartoum course lasts four years. The Assessors were asked whether a year should be added, to be spent in the study of Anatomy and Physiology, but replied that owing to the close individual attention made possible by the smallness of the classes such an additional year was unnecessary. This Report, which contains the Revised Syllabus, will be invaluable to the organizers of schools of medicine for natives elsewhere in the Tropics.

A. G. B.

FOLEY (H.). *Mœurs et médecine des Touareg de l'Ahaggar*. [Notes on Customs and Medicine among the Touareg of the Ahaggar.]—*Arch. Inst. Pasteur d'Algérie*. 1930. June. Vol. 8. No. 2. pp. 167–287. With 10 text figs., 57 figs. on 39 plates & 1 map. [16 refs.] [Pasteur Inst. of Algeria, Algiers.]

This interesting and well illustrated monograph treats of the natives of a mountainous region of the Southern Sahara at about 23° N. latitude. The scientific mission of which the author formed part left Algiers February 16th, reached Tamanrasset on March 5th, left Amegid on April 28th and reached Algiers by a different route on May 14th. They studied, as far as their means allowed, the pathology and

parasitology of the inhabitants. The chief subjects of medical interest discussed are malaria (no evidence of its presence), bronchitis, tuberculosis (von Pirquet reactions showed an infection rate of 33 per cent.), trachoma (general, a discrete form), syphilis (especially a naso-pharyngeal form), gonorrhoea, intestinal parasites (one out of 15 harboured ova of *Hymenolepis nana*; in stations to the north *Ascaris* was common); tinea (22 per cent. of 127 children had trichophyton or favus). The author collected an *Ornithodoros* which is described here as *O. foleyi* and which bites camels, zebus, goats and occasionally man, *Phlebotomus sergenti*, *Anopheles hispaniola* and *Theobaldia longiareolata*.

A. G. B.

INDIA. Annual Report of the Public Health Commissioner with the Government of India for 1928. Volume I. With Appendices. [GRAHAM (J. D.).]—Section X. Jails of India. pp. 264–277.

The average jail population during 1928 was 135,494 (decennial mean 1918–27; 126,280). The constantly sick rate was 21, as in 1927, the lowest on record for 25 years. The admission to hospital rate was 513·3; this was the lowest on record for 30 years. The death rate, 12·94 was also the lowest recorded.

The principal recorded causes of sickness were malaria (127·8), abscess, ulcer and boil (37·0), respiratory diseases (26·6), dysentery (24·8), influenza (24·1), diarrhoea (16·7), pneumonia (10·5), tubercle of the lungs (7·8), anaemia and debility (6·8) and pyrexia of uncertain origin (5·0).

The principal causes of death were, tubercle of the lungs (2·64), pneumonia (2·24), dysentery (1·40), malaria (0·60), respiratory diseases (0·53), enteric fever (0·36), anaemia and debility (0·32), diarrhoea (0·27) and influenza (0·23).

Data are given of these and other diseases at the several jails. Of malaria there were 17,319 admissions and 81 deaths; of pneumonia 1,419 admissions and 303 deaths; of tuberculosis of the lungs 1,039 admissions and 353 deaths. There follow a table showing the gains or losses of weight on discharge from the jails of the eleven provinces, and special remarks on each province.

The Section concludes thus:—

“ This résumé of dry facts regarding the vital statistics of the Indian jails during 1928 cannot but impress the reader who studies it carefully with the steady trend of improvement in health conditions which is taking place almost everywhere. A constantly sick rate (21) below the decennial mean in all the provinces, and the lowest on record; an admission rate (515 per mille)—the lowest for 30 years; a death rate, the lowest on record; an absence of any serious epidemic, despite the prevalence of such in the jail environs, all speak for themselves. As I have indicated in previous annual notes they demonstrate in unmistakable terms how well served the various provinces are by their jail medical superintendents.”

A. G. B.

CALCUTTA. Eighth Conference of Medical Research Workers held at the School of Tropical Medicine, Calcutta, from 17th to 22nd November 1930 [GRAHAM (J. D.), Secretary].—pp. ii+179. 1931. Simla: Govt. of India Press.

The Medical Research Workers who are sustained by the India Research Fund Association meet annually to discuss their programmes

of research, to allot funds and for other business. The Report consists of the Agenda, list of 55 delegates (from the Government of India (15), the Army Department and eight Provinces (25 from Bengal)), a résumé of the proceedings on each day, and 41 appendices. Major-General MEGAW was chairman and Major-General Graham secretary of the Conference. In his opening statement General Megaw said that there were 73 research workers in the pay of the I.R.F.A., 23 of whom are Europeans and 50 Indians. On this occasion the subjects of cholera, malaria, kala azar, rabies and plague were referred to Committees.

The All-India Institute of Hygiene and Public Health is under construction and it is hoped that it will be ready by January 1st, 1932. The immediate creation of a new Central Medical Research Institute is suspended and in the "present financial embarrassment" it is unlikely to materialize for some years. A proposal for an enquiry into respiratory diseases provoked a lively discussion; though the importance of the subject was recognized by all objections were raised on various grounds. It was agreed however that such an enquiry should be taken up as soon as possible and should be considered at the next meeting of the Conference.

Of the resolutions placed before the Conference and passed unanimously the following is of general interest :—

"The Conference resolved that a Cholera Commission should be formed to undertake investigation and study of the whole subject of cholera in India. This should consist of a Director and at least three Assistant Directors. At its headquarters will be constituted a Cholera Bureau and a main laboratory. The location might be at any suitable locality in India, the necessary arrangements for a laboratory and a Bureau being made provisionally in such accommodation as may be available. It should also have field laboratories at such localities as may from time to time be decided on by the Director, Patna however being retained, to start with, as a base for work on bacteriophage.

"This Commission should be appointed for five years in the first place, and the Director should work towards the establishment of a good organization of a semi-permanent kind, having in view the probability that research into cholera in India would in any case last for some years and require eventually a systematized epidemiological enquiry in many parts of the country.

"This Commission would work in very close touch with the Directors of Public Health of the Provinces.

"It was considered that a sum of two lakhs of rupees should be budgeted for the purpose of this Cholera Commission during the next financial year, this to include all enquiries on the subject of cholera bacteriophage."

The bulk of the Report is occupied by the Appendices, which will repay study by those who wish to know what research work is being carried on in India.

A. G. B.

FAUST (Ernest Carroll). **China's Contribution to Tropical Medicine.**—*Jl. Trop. Med. & Hyg.* 1931. June 1. Vol. 34. No. 11. pp. 145-146.

Of Chinese diseases malaria alone is known to have been prevalent in Ancient China; the symptoms of ague were described in Chinese medical annals as far back as B.C. 2600. It is suggested that bubonic plague was introduced into Yunnan from north-east India, pneumonic plague from Mongolia, typhus and relapsing fever from the same country,

cholera by way of ships from India and dengue in the same fashion from Malaya. Syphilis was known as early as the seventh century, when mercury was prescribed for its cure. The Jesuits, Marco Polo and the Portuguese explorers made no medical contribution, nor did the British East India Company which traded between Canton and Hong Kong. MANSON was the first to enrich China and the world with medical discoveries. His activities are here sketched. For 15 years after MANSON's departure (1889) no work on tropical diseases issued from China though in India and Africa much was doing. Recent activity begins with LOGAN's discovery of *Schistosoma japonica* in Central South China and goes on to the research programme of the China Medical Missionary Association (1907). More recent events will be familiar to readers. The author notes that in the last decade many young Chinese physicians have been trained and are now actively engaged in research.

A. G. B.

MUMFORD (R. H.). **Out Patient Work on One of the Pescadore Islands.**—*China Med. Jl.* 1931. Aug. Vol. 45. No. 8. pp. 737-742. [3 refs.]

An account of a visit to one of the Pescadores, which lie between Formosa and the mainland of China. The island is 3 by 2 miles, and often cut off by rough seas from Formosa. It is treeless and wind swept; with crops protected by stone walls. Most of the 3,200 inhabitants are fishermen. The women and children cultivate maize, green vegetables and sweet potatoes and raise fowls. 220 patients were seen. The chief diseases were of the eye. An islander with a pair of perfectly sound eyes is exceptional. Many were blind in one or both. Diseases seen were glaucoma, chronic keratitis, trichiasis, entropion, cataract, pterygium, and a mixture of these conditions.

A. G. B.

HUDSON (Ellis H.) & YOUNG (Agnes L.). **Medical and Surgical Practice on the Euphrates River. An Analysis of Two Thousand Consecutive Cases at Deir-Ez-Zor, Syria.**—*Amer. Jl. Trop. Med.* 1931. July. Vol. 11. No. 4. pp. 297-310. [7 refs.]

Deir-ez-Zor is situated on the Euphrates 300 miles north-east of Damascus. With a population of 25,000 it is a trade centre for nearly half a million. Of the 2,000 patients, 57 per cent. were males. Rickets was noted in 26 children, all extreme cases. Tuberculosis is a serious problem; 168 cases were seen with 48 positively diagnosed pulmonary cases; the spine, bones and joints came next in frequency. There were 4 cases of typhoid and 2 of paratyphoid A, a small number in view of the prevalent insanitary habits. Of syphilis there were 319 cases, men and women about equal. It has predilection for the skin, lymph nodes and bones, the viscera escape serious damage and nerve syphilis is practically absent. It is not here a venereal disease and is so common that it is considered universal. It is chiefly a childhood exanthem. When volunteers were called for for blood transfusion, of 13 presumably healthy persons who presented themselves as donors, 6 had a

positive Kahn reaction. The similarities with yaws are noted [see this *Bulletin*, Vol. 26, p. 177, HUDSON].

There were 27 cases of malaria, only 2 of them in children; the disease is not indigenous. No indigenous case of leishmaniasis was seen, which is attributed to the "scarcity of insect life." The greatest single source of acute illness was amoebic dysentery, for which the housefly, present everywhere in swarms, is held largely responsible; 144 cases were noted. Defaecation is promiscuous; the meat and vegetable market is littered with faecal deposits; the disease is of the house rather than the tent. Ova of *Taenia saginata* were found in 42 stools and of *Hymenolepis nana* in 8, ascaris ova in 94 and ankylostome ova in 28. There were 23 cases of lobar pneumonia and 50 of bronchopneumonia in children. They were struck by the paucity of cases of disease of the circulatory system. A table shows the systolic blood pressure findings in 1,056 adults. With the pressure plotted in multiples of ten, half had pressures of 100 and 110 mm. Hg. The number of conjunctivitis cases is not given, but of smears of conjunctival discharge 107 showed the Morax-Axenfeld bacillus, 94 the pneumococcus, 45 diplococcus, 31 Koch-Weeks bacillus and 15 gonococcus. Trachoma and trichiasis were common. Diseases not encountered were—diphtheria, cholera, erysipelas, tetanus, anthrax, undulant fever, plague and leprosy.

In their "discussion and summary" the authors note that almost 50 per cent. of the illnesses have a definite public health aspect. The diseases of trachoma, tuberculosis, amoebic dysentery and syphilis "merit direct attack from the standpoint of community education and treatment."

A. G. B.

RUGE (Reinhold). Die Einbeziehung der Tropenkrankheiten in die Unfallversicherung. [**The Inclusion of Tropical Diseases in Insurance against Accidents.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. June. Vol. 35. No. 6. pp. 323-331.]

This paper owes its origin to the extension of the German State insurance scheme to the industrial diseases of seamen. It is first of all necessary to understand what is meant by Tropical and then by Tropical Diseases. Setting aside the Tropics proper one may follow SUPAN, who regarded that part of the earth's surface which lies between the isotherms of 20° C. as hot country, or WAGNER, who included as subtropics that part of the temperate zone which is characterized by winter rain and summer drought, which adds a large area to SUPAN's zone. In a publication of the German Government, Tropical Diseases are defined as "all infectious and parasitic diseases peculiar to the tropics and subtropics," which omits diseases of toxic origin and heatstroke as well as malaria and others. A more liberal definition is that of H. RUGE: Tropical diseases are illnesses which are indigenous to warm countries or chiefly occur there.

The author reaches the conclusion that for the purpose of the German "Verordnung" definitions are required of hot country, tropical diseases, and which of these are to be regarded as "accidents" and that such definitions must be furnished respectively by the meteorologist, the physician and the jurist.

A. G. B.

REED (Alfred C.). **Organized Tropical Medicine in the Western United States.**—*California & Western Med.* 1931. Sept. Vol. 35. No. 3. pp. 185–188. [Pacific Inst. of Trop. Med., Univ. of California, Berkeley.]

Deals with the establishment on the Pacific coast of U.S.A. of the Pacific Institute of Tropical Medicine, a division of the Hooper Foundation for Medical Research of the University of California. It is to be educational, giving six-week courses in tropical medicine, to conduct research and to care for patients.

A. G. B.

MACAULAY (T. S.). **European Recruits for the Tropics.**—*Jl. Trop. Med. & Hyg.* 1931. Aug. 1. Vol. 34. No. 15. pp. 237–238.

The author, who is a medical officer for rubber estates in Malaya, is dissatisfied with the medical examinations which young Europeans undergo at home, and gives case details of employees who, for reasons of health or temperament, proved unfit for tropical life.

A. G. B.

EDGE (P. Granville). **The Scope and Uses of Vital Records in the Tropics.**—*Proc. Roy. Soc. Med.* 1931. July. Vol. 24. No. 9. pp. 1269–1277 (Sect. Trop. Dis. & Parasit. pp. 35–43). With 1 fig. [5 refs.] [Summary appears also in *Bulletin of Hygiene*.]

In civilized countries vital statistics are recognized as essential adjuncts of public health work, as evidence both of the success of such work and the directions in which further preventive measures are required. For various reasons the statistics available from many of our tropical dependencies are entirely valueless. Such records of considerable accuracy and value could, and should, be obtained by degrees. As a beginning, small scale inquiries should be persistently and regularly made. For small areas it should be possible to obtain accurate population figures, by sex and civil state and approximate ages, births and infant mortality-rates, death-rates and their causal and seasonal variations. By such means, too, the native peoples would become familiar with the details such inquiries entail, the frequent visits of officials come to be regarded as matters of mere routine, and any suspicions aroused during the early stages would gradually disappear. It would be only a matter of time before the area and scope could be extended. The Dutch have made a wide range of epidemiological studies discussing a variety of health problems peculiar to the tropics, and there is no reason to suppose that similar work is impossible in English dependencies.

A. B. Hill.

OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. Comité Permanent de l'Office International d'Hygiène Publique: Session Ordinaire d'Octobre, 1931. [**Standing Committee of the Office International: Session of October, 1931.**—21 pp. [3 refs.] 1931. Paris: Office Internat. d'Hyg. Pub., 195, Boulevard Saint-Germain.

The topics considered by this Committee are numerous and varied. A few will here be noticed.

The Pilgrimage Committee sat with the main Committee to examine a report on the Mussulman pilgrimage of 1931. It is noted that instead of 120,000 pilgrims, there were this year only 64,000. North Africa and

Persia furnished hardly any; the cause is believed to be the general economic depression. There were few cases of malaria and dysentery, and none of cholera; 4 healthy carriers of agglutinable vibrios were taken off at El Tor. Though the majority of pilgrim ships are well found there are some which are defective and should not be licensed.

Other questions related to the application of the International Sanitary Convention of 1926, especially the periodic deratization of ships. The Committee is considering the rules in force in different countries concerning the transport of bodies in coffins, with a view to their co-ordination. After a section on the drugs of addiction we come to the infectious diseases. Interrogations addressed to four countries on anti-plague vaccination brought replies both for and against its efficiency. The subject is discussed and it is noted that the Indian replies were in favour and that in that country vaccination was popular. It is observed that the methods of preparation of the vaccine are not uniform. The details of the deratization of ships are discussed. An epidemic of cholera in Iraq is compared with another in Shanghai. In the first the fatality was 60 per cent.; in the second 8 16 per cent.

Of yellow fever it is noted that the zones of endemicity are now being delimited. Observations in Belgian Congo showed that *Ae. aegypti* can be transported in aeroplanes between the chief centres in that country. Four positive results are recorded [without details], but it is stated that when the flight had exceeded 1,700 metres in altitude the mosquitoes were dead. These experiments, says the writer, must be repeated with greater precautions. [For similar experiments made in southern U.S.A. see *Pub. Health Rep.* 1931, Vol. 46, p. 2775.] Other diseases discussed are haemorrhagic icterus, eruptive fever in Rumania, encephalitis, tuberculosis, undulant fever, trachoma.

A. G. B.

ORR (J. B.) & GILKS (J. L.). **Studies of Nutrition. The Physique of Two African Tribes.**—*Med. Res. Council Spec. Rep. Ser. No. 155.* 82 pp. With 11 folding graphs. 1931. London: H.M.S.O. [2s.] [Review appears also in *Bulletin of Hygiene.*]

This report records preliminary observations on the physique and susceptibility to disease of two East African tribes, with special reference to the possible relation of nutritional factors to physical development and predisposition to disease. The Akikuyu were chosen as an example of a vegetarian tribe, their food consisting largely of maize and millet with roots and fruit, while the Masai represented a meat-eating race, their diet containing large quantities of meat, milk and blood. Studies were made of the average physique of the two tribes and of their growth rates during childhood. The incidence of diseases among the two groups was investigated by examining hospital records and by a personal survey of a large number of natives. The adult Masai male was 5 inches taller and 23 lb. heavier than the adult Kikuyu and his muscular strength was 50 per cent. greater; it was not possible to determine the respective influences of heredity and nutritional factors on these differences in physique. Bone deformities, dental defects and anaemia were much commoner among the Kikuyu children than among the Masai children; there was no significant difference in the distribution of enlarged tonsils in the two tribes. Respiratory diseases and tropical ulcer accounted for most of the sickness met with among the

Akikuyu, whereas the Masai suffered chiefly from constipation and arthritis. The special features of the Kikuyu diets were a superabundance of cereal and a deficiency of calcium; the serum calcium of these men was low and it could be increased by adding to the diet either calcium salts, cod-liver oil or milk. An attempt was made to correlate the occurrence of tropical ulcer with dietetic deficiencies by following the rate of healing of established ulcers in hospital when various supplements were added to the patients' diets. The ulcers gradually healed as the general condition of the patients improved, but no single dietary constituent that was tried (e.g., milk, cod-liver oil, tomatoes, mineral salts) exerted an obvious healing influence.

Although the investigation was admittedly incomplete the results lend support to the view that ill-balanced diets may be responsible to a considerable extent for the loss of health and efficiency among the natives which hampers the development of many districts in our tropical dependencies.

S. J. Cowell.

MASON (Eleanor D.) & BENEDICT (Francis G.). **The Basal Metabolism of South Indian Women.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 75-98. With 1 text fig. [Refs. in footnotes.] [Women's Christian College, Madras, & Nutrition Lab. of the Carnegie Inst. of Washington, Boston.]

The basal metabolism of 54 native women (Tamils, Malayalis, Telugus, Coorgs and Kanarese) in South India, of ages from 17 to 31 years, was measured by the Benedict portable apparatus. No significant differences between the various groups of Indians were found in the measurements, but these are lower than in Westerners. The average percentage deviation of the basal heat production from the Harris-Benedict standards is -16.9 per cent. with variations of from -5.3 to -33.0 per cent. From the Aub and Dubois standards the average deviation is -17.2 per cent. with extremes of -4.6 and -28.7 per cent. Possible causes of this deviation are: (1) low protein metabolism; (2) tropical conditions of climate; and (3) a state of relaxation during repose as complete as that which is found during sleep among Westerners. Reference is also made to the evidence which suggests that there is a definite racial factor which in part accounts for part of the difference.

M. E. Delafield.

MUKHERJEE (Harendra Nath) & GUPTA (Pratul Chandra). **The Basal Metabolism of Indians (Bengalis).**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 807-812. [34 refs.] [Carmichael Med. College, Calcutta.]

The basal metabolism of eighteen normal healthy Bengali young men between the ages of 20 to 29 was studied. The determinations were done with the Douglas bag and the Haldane gas analysis apparatus. On the average the basal metabolism is 13.3 per cent. below the Aub and Dubois standard. The relationship between vital capacity and area of the body surface is 14.8 per cent. below normal Western standards. Pulse pressure is also lower, judged on the same standards.

M. E. Delafield.

BANERJI (Niant Dhan). **Basal Metabolism of the Prisoners of the District Jail, Lucknow (United Provinces of Agra and Oudh).**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 229–238. With 4 graphs & 1 plate. [8 refs.]

Using the “British Benedict portable metabolism apparatus closed circuit type” the basal metabolism of 145 prisoners, Hindus and Mohammedans was determined. The average deviation from European standards was –6.9 per cent. High atmospheric temperature with a high degree of humidity are suggested to be the most important factors which go to lower the basal metabolic rate of Indians in India.

M. E. Delafield.

RADSMA (W.). *De ruststofwisseling bij den Europeaan in de tropen.*—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Jan. 1. Vol. 71. No. 1. pp. 6–29. [11 refs.]

——. **Metabolism during Rest of the European in the Tropics.**—*Arch. Néerlandaises de Physiol. de l'Homme et des Animaux.* 1931. Mar. Vol. 16. No. 1. pp. 91–122. [18 refs.] [Lab. of Physiol. Chem., Med. Univ., Batavia, D. E. I.]

The apparatus used in this research was that of Knipping, but the Douglas bag was also employed in a few instances. The subjects of the experiments were European students, nearly all between 20 and 23 years of age, and about 50 were examined. It is claimed that “the number of our subjects is sufficiently large to enable us, without any further statistical calculation, to draw one conclusion at least for this age category, that basal metabolism with Europeans in the tropics is reduced, at least that it is lower than the standard figures prevailing for that in Europe and America.” The actual differences found were :

(1) *Group 1.* 8 persons with residence of about 3 months in the tropics, examined after 1 hour's rest in bed the average was –10.57 per cent. Benedict. All in this group were below the normal figure.

(2) *Group 2.* 7 persons, with residence of about 1 year in the tropics, examined after $\frac{1}{2}$ hour's rest the average was –4.3 per cent. Benedict. One in this group was, however, +9.6 per cent.

(3) *Group 3.* 26 persons, with residence of 2 years or more in the tropics, examined after $\frac{1}{2}$ hour's rest the average was –3.01 per cent. Benedict. Seven of the group were above the Benedict normal.

No explanation of the difference is suggested, but among possible causes are climatic conditions, dietetic factors, and clothing differences.

[As the degrees of difference in the whole series are so variable, it is unfortunate that the figures were not statistically tested to determine their significance.]

M. E. Delafield.

i. BURNIE (R. M.). **Observations on Tropical Ulcer.**—*West African Med. Jl.* Lagos. 1931. Apr. Vol. 4. No. 4. pp. 77–86. With 2 folding charts. [80 refs.]

ii. SMITH (E. C.) & ELMES (B. G. T.). **Experimental Tropical Ulcer.**—*Ibid.* pp. 87–91. With 8 figs. on 2 plates. [6 refs.] [Med. Research Inst., Lagos.]

iii. BRAITHWAITE (E. C.). **Ulcers.**—*Ibid.* pp. 93–94.

i. At least 95 per cent. of ulcers of the skin met with in Kano, Northern Nigeria, are of the type described as *ulcus tropicum*. The

author summarizes the literature, chiefly from the epidemiological standpoint, and adds observations of his own. He gives charts of the ulcer percentage of total new attendances per month at Kano hospital and similarly for labourers on railway construction; both show a big rise in October-November. Contrary to the opinion of many writers he finds that these ulcers flourish in the dry sandy districts of Northern Nigeria as luxuriantly as in damp swampy regions. It is exceptional to meet with them in any but the poorer classes. Of 649 ulcers treated in 1927, 95.5 per cent. were on the leg below the knee. Predisposing factors are discussed under the headings, trauma, debility, diet deficiency. Smears made from an unselected series of 133 untreated ulcers after swabbing gave spirochaetes and fusiform bacilli 107, fus. alone 7, spir. alone 2, neither 17; all of the last class had received treatment. Other fairly constant findings were a gram-positive coccus and a diphtheroid bacillus. All attempts to obtain pure cultures of the spirochaetes and fusiforms have failed.

Fourteen experiments of transmission performed on man are described. It is deduced from them that fusiform bacilli are the chief factors in imparting to the ulcers their virulent characters and that probably other organisms play a part both by virtue of their toxic principles and by stimulating the activities of the fusiform bacilli. Of the various treatments recommended it is probable that any may be followed by rapid healing, for equally good results are obtained by cleansing of sloughs and simple water or saline dressings. In early cases an ointment of bismuth nitrate, iodoform and vaselin [? Bipp] has been found most useful; in cases where destruction of tissue has occurred surgical measures are required. Though the author realizes that prevention of injury would reduce the incidence he questions whether native labourers could be induced to wear protective coverings for the legs, and suggests a weekly or bi-weekly inspection for the early stages. The two main essentials for production of ulcer are—injury to the skin and some condition which lowers resistance.

ii. The authors at Lagos inoculated 20 *Macacus rhesus* and obtained positive results in 12, but in only one was a well-marked ulcer produced. They consider these monkeys unsuitable. They then made 12 experimental inoculations in natives, obtaining positive results in 6. The inoculation, which was autogenous in 4, was made intracutaneously with a hypodermic syringe. The results are tabulated. It is concluded that tropical ulcer can be produced in suitable subjects in this way, that in the lesions fusiform bacilli at first predominate, later spirochaetes, that N.A.B. administration did not stop the formation of the ulcer in two cases, that bacilli of the pseudomonas group were recovered from all the experimental lesions but one. In one experiment spirochaetes and fusiforms were present in abundance up to 21 days. Experiments were also made with cultures. Neither spirochaetes nor fusiforms could be obtained free from contamination. Two types of mixed cultures were available: (1) aerobic cultures containing numerous spirochaetes, scanty fusiforms and pseudomonas; (2) anaerobic cultures containing numerous fusiforms, elongate organisms and pseudomonas. Three positive results were obtained with spirochaete cultures. With the anaerobic cultures there was no evidence of mutation of fusiforms into spirochaetes. The authors stress the inconclusiveness of the experiments.

iii. A description by a surgeon of the treatment of tropical ulcer. Briefly, it consists in curetting, cauterizing, and suitably dressing till

healthy granulations are formed, when Thiersch grafts are applied. For the details, which are obviously important, the paper must be consulted. A good method with children or after elephantiasis is the implantation method whereby grafts the size of a pin's head are thrust into the granulations.

A. G. B.

VERBUNT (J. A.). Het ulcus phagedaenicum tropicum. [**Phagedaenic Tropical Ulcer.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. Nov. 7. Vol. 75. No. 45. pp. 5461-5471. With 1 plate.

In this clinical lecture the author goes in some detail into the symptomatology, diagnosis and treatment of tropical phagedaena or ulcer. He deals with a case of a solitary, painless, oval ulcer, situated over the ankle and having an overhanging, raised, undermined indurated edge and a base which was partly granulating, partly covered with yellowish green, gangrenous, necrotic membrane. A stained smear made with material from under the overhanging margin showed numerous leucocytes many of them badly staining, numerous organisms especially cocci, bundles of spirochaetes larger than the *Spirochaeta pallida* some finely and some loosely spiral, and fusiform bacilli. The combination of spirochaetes and fusiform bacilli is especially characteristic. In the diagnosis of such ulcers syphilis and yaws have to be excluded and these affections may be present in addition. If the ulcer heals under treatment in 4 to 6 weeks it may be taken to be simple tropical ulcer. The treatment consists in the use of iodoform or bleaching powder, potassium permanganate solution or salicylic acid ointment. The surrounding skin may require to be protected during treatment with a zinc oxide paste.

W. F. Harvey.

INNES (Flora R.). **Notes on the Diagnosis and Treatment of Ulcus Tropicum.**—*Indian Med. Gaz.* 1931. Aug. Vol. 66. No. 8. pp. 430-431. [Med. School, Vellore, S. India.]

For many years the author has treated tropical ulcer with a thick dusting of quinine sulphate for the first dressing and of cinchona powder subsequently. This treatment appears to be welcomed by the people of Vellore, South India.

"The method is this: Make a solution of sodium bicarbonate in cold water, roughly two drachms to a pint. Soak cotton-wool in it and simply apply it to the ulcer, after a few minutes remove it and the glairy discharge will adhere to it; repeat this three to five times until the clean rough red base appears. Dust on quinine or cinchona powder thickly and dress. Give the patient a week's supply of sodium bicarbonate and of cinchona (of the latter 5 to 10 grains for each daily dressing is usually sufficient) and instructions to carry out the same method at home, being careful to remove the remains of the previous day's cinchona. Next week the patient returns with the ulcer often level with the skin and the report of no pain and good sleep from the first night. The dressing is repeated and another supply of sodium bicarbonate and cinchona given. The method has the additional advantages of being efficacious, cheap and of requiring no special skill. We have passed on the method to village teachers and workers. In road-side work we frequently use cinchona as a prophylactic dressing for fresh wounds as so many of them develop *ulcus tropicum* later."

A. G. B.

HOFFMANN (J. M.). De geschiedenis van gele koorts en dengue in Europa. [**The History of Yellow Fever and Dengue in Europe.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. Oct. 31. 75th Year. No. 44. pp. 5384-5390. [23 refs.] [Inst. of Trop. Hyg., Amsterdam.]

As the mosquito *Aedes aegypti* is prevalent in parts of Europe up to 44° N. latitude, the possibility of the epidemic occurrence there of yellow fever and dengue is a matter of importance. Yellow fever has repeatedly visited Europe since the first epidemic in Guadeloupe in 1635. Spain and Portugal have suffered most. The appearance of dengue in Europe goes back to the end of the 18th century. It, however, has ravaged both the east and west of Europe. In Greece the development of epidemic dengue is traced to the opening of the Suez Canal. The epidemics in Athens of 1927 and 1928 are well known. In the first of these about 20,000 people were affected. Really great epidemics can only develop in the countries where the insect vector is abundant, and may only come to an end with the advent of the cold weather. Not only so, but it is to the transportation of the infected mosquito rather than the human case that great epidemics of yellow fever and dengue are due. The patient is no longer infective for mosquitoes after the third day and as the incubation period of these two diseases is a matter of 5 to 12 days, fumigation of a ship from an infected port, which has been more than 15 days on the journey, is sufficient if no fresh cases have occurred. It is otherwise, of course, if cases have occurred on the journey. With the development of air-travel, however, the subject of quarantine of individuals arriving from infected countries becomes one of considerable importance. Research with yellow fever virus should not be undertaken in places where *Aedes aegypti* is prevalent and yellow fever is not endemic.

W. F. Harvey.

ROSS (Ronald). **A Mathematical Justification of Mosquito-Control.**—*Jl. Trop. Med. & Hyg.* 1931. July 1. Vol. 34. No. 13. pp. 177-183. With 3 diagrams in text. [1 ref.]

It is not possible to make satisfactory experiments on the influx, efflux, and varying density of mosquitoes without a mathematical analysis. The subject is really a part of the mathematical theory of migration. There must be for every living unit a certain distance which that unit may possibly cover if it continues to move all its life, with such capacity for movement as Nature has given it, always in the same direction. This distance is the limit of migration and scarcely one in many billions of living units is ever likely to reach it, not because the units do not possess the capacity for covering the distance, but because the laws of chance ordain that they shall scarcely ever continue to move always in the same direction. Owing to the constant changes of direction which must take place in all random migration the large majority of units must tend to remain in or near the neighbourhood where they were born. Thus though they may really possess the power to wander much further away, right up to the ideal limit, yet actually they generally find themselves confined by the impalpable but no less impassable walls of chance within a much more circumscribed area. Mathematical analysis also shows that as a general rule the number of immigrants into any area of operations must for practical purposes be very small or inappreciable a short distance within the boundary

line. The statement, frequently made, that local anti-propagation measures must always be useless owing to immigration from outside, is untrue.

[This is a reprint of a paper entitled the Logical Basis of the Sanitary Policy of Mosquito Reduction read at the Section of Preventive Medicine of the International Congress of Arts and Science, St. Louis, in 1904, and published in the *British Medical Journal*, May 13th, 1905. The author republishes it as he believes fallacious experimental demonstrations of the possibility or impossibility of mosquito-control are still being made, and few workers of the present generation seem to have heard of this early study of the problem.]

A. B. Hill.

STEARNS (Allen E.) & STEARNS (Esther Wagner). **Chemotherapeutic Equilibria.**—*Jl. Experim. Med.* 1930. Feb. 1. Vol. 51. No. 2. pp. 341–356. [23 refs.] [Division of Physical Chemistry & Dept. of Preventive Med., Univ. of Missouri, Columbia.]

In spite of the important discoveries which have been made in the department of chemotherapy it is true that so far general principles are lacking which might guide in the search for further effective chemotherapeutic agents. Thus the authors commence by quoting a statement that "the real difficulty lies in the necessarily opportunistic experimental method, and the lack of a rational scientific means of approach." They claim that "the considerations presented in the present paper are sufficiently general to be valid regardless of the mechanism of chemotherapeutic action which may be eventually discovered" and "it is hoped that they will suggest a tentative rational approach to such a study." There then follows a discussion of certain physico-chemical phenomena connected with antiseptic dyes, which have been investigated by the authors and others with special reference to their bearing on problems of chemotherapy. The following are the chief points examined. (1) The effect of hydrogen-ion concentration on the staining of bacteria by a dye such as gentian violet and on the bactericidal action which it produces; the parallel behaviour is emphasized in these two effects, e.g., in the case of a basic dye increased alkalinity (pH) intensifies both. (2) The concentration of the dye which is attainable in the blood with safety to the animal; it is estimated that for gentian violet, this is sufficient to permit of effective antiseptic action being exerted. (3) The rate of absorption of dye (gentian violet) by protein (gelatin) till equilibrium is attained; this is rapid, and the same is presumably the case with bacteria; hence the organisms rapidly fix the dye and the latter will immediately begin to exert its bacteriostatic influence and to affect the vitality of the bacteria, even although they may not be quickly sterilized. (4) The formation of colourless derivatives of the dye (gentian violet), which readily occurs in the blood; these are not devoid of antiseptic properties, hence disappearance of the stain does not necessarily imply cessation of antiseptic action. (5) The parallel existing between factors which favour bactericidal action and staining on the one hand, and those which cause flocculation of protein or agglutination of bacteria on the other. (6) A comparison of the electrical conductivity of a mixture of protein (gelatin) and gentian violet with that of a mixture containing, instead of the dye, another base such as nicotine or potassium chloride; the results show that only in the first case is the conductivity less than

the calculated value ; the dye therefore appears to form an un-ionized compound with the protein—it is thought that specificity in antiseptic action may be related to this property.

[The aim of such enquiry being to formulate generalizations, the views of the authors are of interest, although they are expressed in a terminology which tends rather to confuse than to enlighten the biological reader. It must be emphasized, however, that the mass of observed facts can scarcely be classified satisfactorily in this broad fashion at present. For instance, the authors state that "the presence of protein or other matter of a similar nature which chemically resembles bacteria should decrease the effectiveness of any agent by binding a portion of it in an ineffective combination" and the action of serum on antiseptics may be mentioned in this respect. While this is true of gentian violet, the remarkable fact is that it is not the case with such antiseptics as optoquine or acriflavine. Again, the fact that the ratio of the antiseptic power of gentian violet for staphylococcus and *B. coli* differs so markedly from that of brilliant green for the same two organisms, does not seem to fit in with a simple scheme.]

C. H. Browning.

KROÓ (H.) & V. JANCsó (N.). Die Bedeutung des Reticuloendothels für die Immunität und Chemotherapie. (Der chemotherapeutische Abheilungsvorgang.) [**Significance of R.E. in Immunity and Chemotherapy.**—*Ztschr. f. Hyg. u. Infektionskr.* 1931. May 22. Vol. 112. No. 3. pp. 544–558. With 4 text figs. [30 refs.] [Robert Koch Inst., Berlin.]

Seeking for some method of eliminating the R.E. system other than blockade with large doses of highly concentrated colloidal solutions or suspensions, the authors used an "electrocolloidal" copper solution intravenously. The resulting damage to the R.E. system could be demonstrated morphologically and functionally. One to four hours after injection of 0.075–0.1 cc. into the mouse, the Kupffer cells were already necrotic ; liver cells, leucocytes and lymphocytes were unaffected. 0.025 cc. sufficed to diminish the activity of the Kupffer cells towards a subsequent dose of colloidal gold and 0.1 cc. to arrest it completely within 15 minutes.

Splenectomized mice treated with this solution failed wholly or partly to develop agglutinins and haemolysins, or an active immunity to pneumococci. Using splenectomized and normal mice infected with trypanosomes or spirochaetes, they studied the effect of chemotherapeutic substances in doses insufficient to bring about immediate cure. In animals receiving the copper solution they obtained the following results. Arsenophenylglycin, atoxyl, etc., acted as in the normal animal. Arsacetin, neosalvarsan, etc., which acted in the splenectomized as in the normal animal, showed after copper an enhanced curative effect. With salvarsan, etc., the curative effect was diminished. Evidently the process of cure is a double phenomenon. The chemotherapeutic agent causes the sudden disappearance of parasites from the blood-stream and acts independently of the R.E. ; development of immunity following very quickly on the destruction of parasites completes the cure and does not take place with abrogation of the functions of the R.E.

E. Weston Hurst.

EMANUELS (B. J.). Vergelijkend, speciaal bij tropentemperaturen verricht, onderzoek naar de waarde van de nieuwe serumreactie voor de syphilisdiagnostiek, "Meinicke's klärungsreaktion auf Syphilis" (M.K.R.), ten opzichte van de reacties van Wassermann, Sachs-Georgi en Vernes. [**Comparative Research, Especially under Tropical Temperature Conditions, on Serotests for Syphilis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Sept. 15. Vol. 71. No. 12. pp. 1026–1035. [19 refs.] [Inst. for Trop. Med., Leiden]

The tropical temperatures had no influence on the reactions. 750 specimens were tested comparatively, 627 with all the four tests mentioned. Of the latter 285 gave negative results in the whole series. The test was positive with M.K.R. in 326 cases, with Sachs Georgi in 186, with Wassermann in 166 and with Vernes in 154 cases. Out of 122 cases in which only the M.K.R. yielded a positive result, in 79 the patient was clinically suffering from syphilis (mostly primary, tertiary and latent stages).

W. J. Bais.

ORENSTEIN (A. J.). **Vaccine Prophylaxis in Pneumonia. A Review of Fourteen Years' Experience with Inoculation of Native Mine Workers on the Witwatersrand against Pneumonia.**—*Jl. Med. Assoc. South Africa*. 1931. June 13. Vol. 5. No. 11. pp. 339–346. With 3 diagrams. [10 refs.] [Summary appears also in *Bulletin of Hygiene*.]

This paper is a careful study of the results of prophylactic inoculation against pneumonia. Pneumonia has been the chief cause of morbidity and mortality among the native mine workers since the establishment of the gold mining industry on the Witwatersrand. An account is given of the attempts at immunization against pneumonia among the workers. It is maintained that the experiments performed on the natives prior to the introduction of wholesale immunization of all workers have not been conclusive and only one experiment known as Experiment No. 3 appeared to justify the adoption of prophylactic inoculation. This experiment was started on the Witwatersrand in July 1914. Of 55,900 natives of various tribes, one half were inoculated and the other half left as controls. Lister's "typed" vaccine was used, containing five specific "types" with a total content of 2,000 million organisms per dose. One inoculation was given. The inoculated natives gave a case rate of 16.4 per 1,000 and the uninoculated 20.6 per 1,000. As a result inoculation of all natives was made practically compulsory throughout the mines. There was a gradual rise in the pneumonia death rate between 1920–1928 indicating that prophylactic vaccination had no high protective value. In 1929 inoculation was discontinued on certain mines and the experience of these was compared with those on which inoculation was continued. Mines on which inoculation was continued had a higher attack rate in 1930 than in 1928 while mines on which inoculation was stopped had both a lower attack rate and a lower death rate as compared with the rates for 1928.

In a paper by ORDMAN [*Bull. of Hyg.* 1931, Vol. 6, p. 552] it was held that the inefficacy of the vaccine used was due to a radical change in the bacterial flora in pneumonia. In this paper the contention that the clinical type of pneumonia has radically changed is examined. The author does not agree with ORDMAN's findings either

with regard to the change in the clinical type of pneumonia or that prophylactic inoculation diminished the attack rate in the early period of the natives' service on the mines.

H. M. Woods.

KIRSCHNER (L.). De sero-bacteriologie der croupeuze pneumonie in Nederlandsch-Indië. [**The Sero-Bacteriology of Lobar Pneumonia in the Dutch East Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Sept. 1. Vol. 71. No. 11. pp. 990-1012. [65 refs.] [Pasteur Inst., Bandoeng.]

Lobar pneumonia is one of the most important infectious diseases in the D.E.I. In controllable communities (soldiers) its frequency and the mortality it causes surpass those of enteric and bacillary dysentery. Bacteriological and serological examination of specimens obtained from 105 patients showed that about two-thirds of the cases were caused by pneumococcus Type I and II, the others by Type IV. In a few fever patients, not suffering from pneumonia, Type III was found. In contacts only Type IV was detected. There exists a pronounced parallelism between the virulence of the organism for men and mice. Though generally speaking Type I and II give rise to more serious cases than does Type IV, yet within each of the groups strains of various virulence are found. The estimation of the virulence in mice is more important than the type testing. The author recommends cultivation from the heart blood of the mouse immediately after death. Type specificity is shown by mixing equal parts of a fresh broth culture of the strain with specific serum. An immediate precipitation is followed subsequently by agglutination. Therapeutical experiments with immune serum yielded negative results. The concentrated FELTON serum is of no use after the third day of the disease. Some results obtained with prophylactic vaccination in coolies of a mining company appear encouraging but do not allow of any definite conclusions

W. J. Pais.

KOWALZIG (Hans). Erfahrungen bei der Behandlung der Lungenentzündungen der Neger im Hochland von Angola. [**Treatment of Lung Inflammations of Negroes in the Highlands of Angola.**]—*Deut. Med. Woch.* 1931. June 26. Vol. 57. No. 26. pp. 1109-1110. [3 refs.]

Treatment by solvochin and transpulmin. No details.

A. G. B.

BONNE (C.), KOUWENAAR (W.), MÜLLER (H.) & VOS (J. J. Th.). De levercirrhose in Nederlandsch-Indië. [**Cirrhosis of the Liver in the Dutch Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. June 1. Vol. 71. No. 6. pp. 506-617. With 18 figs. on 9 plates. [14 refs.]

This elaborate report, the reading of which may be strongly recommended to those interested, is the result of the collaboration of four anatomo-pathologists in the Dutch East Indies in regard to a subject studied by the International Committee on Geographical Pathology. It deals with a total number of 12,957 postmortems, of which those showing cirrhotic alterations of the liver, either as the immediate cause

of death or as a casual finding, are taken into consideration. These cases are presented in tabular form at the end of the report (58 pp.).

The various types of cirrhosis of the liver described in the literature are reviewed. The authors cannot in their material find argument for the recognition of special types of cirrhosis, known as *fatty cirrhosis*, *pigment cirrhosis*, *cirrhosis following acute yellow atrophy*, *tubercular cirrhosis*. Single cases were seen of *Wilson's disease*, *cardial cirrhosis*, *juvenile cirrhosis* and *biliary cirrhosis*, which cases are briefly described. *Zoöparasitic cirrhosis* (in clonorchiasis and schistosomiasis) was seen in a few cases. It may be deducted from the material in that, like the causal infestations giving rise to this type of cirrhosis, it does not occur endemically.

The main part of the report deals with *Laennec's cirrhosis* and *syphilitic cirrhosis*, both frequently met with.

By varied grouping of their material the authors invariably arrive at the conclusion that Laennec's cirrhosis is considerably more frequent in Java and Sumatra than it is in most other countries. This increased frequency especially concerns Javanese men, but also Chinese men and less Javanese women. Possible causes for the high frequency of liver cirrhosis are considered. No proof exists of the etiological influence of the natives' spiced food. The stomach, which in the first place might be damaged by such factors, is rarely affected by disease in the Malay. Nor may diseases of the bowel or intestinal fermentation be considered with any probability as the causes. The consumption of alcohol by the races under consideration is certainly very low. The possible influence of malaria (SITSEN) is not proved, but deserves further investigation, either to support or to reject this hypothesis. The alleged high copper content of the cirrhotic liver (MALLORY, ASKANAZY) was not regularly found. Thus the actual causes of the prevalence of the disease remain obscure.

The frequency of primary cancer of the liver, nearly always of the hepatocellular type, is emphasized. It practically always occurs in cirrhotic livers.

Syphilitic cirrhosis (or better syphilis of the liver, because often no actual cirrhosis exists, but rather perihepatitis and strands of connective tissue altering the liver into a "hepar lobatum") was frequently met with, more in Chinese, who suffer more from syphilis in general, than in Malays. In rare cases it was the immediate cause of death.

The illustrations represent beautifully the various types of affection under consideration.

W. J. Bais.

BUTTIAUX (R.) & SÉVIN (A.). Sur l'étiologie des colites ulcéreuses (étude clinique et expérimentale). [**Etiology of Ulcerative Colitis.**] —*Ann. Inst. Pasteur.* 1931. Aug. Vol. 47. No. 2. pp. 173–219. With 6 text figs. [26 refs.] [Pasteur Inst., & St.-Sauveur Hosp., Lille.]

Colitis, which constitutes the most frequent affection of the large intestine, may be at one time trivial and transient, at others extremely grave. The form here considered is ulcerative, chronic and usually haemorrhagic. Sigmoidoscopy and radioscopy are the two most powerful aids to diagnosis and the latter should always be employed to obtain an idea of the localization and importance of the lesions. The majority of modern workers recognize that the cause of ulcerative colitis is an

infective agent. Some like BARGEN attribute all forms to the same pathogenic agent; others recognize a multitude of microbes.

The difficulty of this subject is greatly increased, as the authors have shown by their researches during more than five years, by the fact that the pathogenic microbes can rarely be isolated from the faeces, but have to be removed from the bottom of the ulcers. The employment of rectoscopy or sigmoidoscopy has greatly facilitated this technique of direct isolation from the mucous membrane. On this basis all forms of colitis are discussed with the exception of toxic colitis due to mercurial poisoning.

The following conditions are distinguished :—

(a) Ulcerative colitis due to dysentery bacilli; certain cases of chronic bacillary dysentery are described.

(b) Ulcerative colitis due to the Salmonella group. In 132 cases of severe colitis they isolated Morgan's bacillus 12 times. In one case the symptoms had persisted for five years, and the patient's serum agglutinated the organism in a strength of 1 : 200.

(c) Ulcerative colitis due to the gonococcus is also recognized.

(d) Ulcerative colitis due to organisms which normally exist in the intestine. These are, the streptococcus, the staphylococcus, *Bact. coli*, and the pneumococcus. Anaerobic organisms such as the *B. perfringens* can also become pathogenic.

(e) Ulcerative colitis due to the diplo-streptococcus of Bargaen. After a period of scepticism the authors recognize the important rôle played by this organism in ulcerative colitis.

(f) Finally, they recognize as distinctive a form of haemorrhagic colitis caused by a diplococcus isolated by themselves. This diplococcus they consider has distinctive cultural characteristics and is agglutinated by the patient's serum in a dilution of 1 : 100. They have succeeded in producing a specific agglutinating serum by repeated subcutaneous injections of the microbe, a titre of 1 : 5,000 being obtained.

The paper closes with a short account of other forms of colitis, including amoebic dysentery and giardiasis, and experimental work on the inoculation of rabbits with strains of the organisms mentioned above. [A great deal of this experimental work is not very convincing.]

P. H. Manson-Bahr.

BOUFFARD. La pneumococcie chez les noirs.—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.-May-June. Vol. 29. No. 2. pp. 229-235.

CANY (G.). Les applications tropicales des eaux arsenicales de la Bourboule.—*Rcv. Prat. Malad. des Pays Chauds.* 1931. May. 10th Year. Vol. 11. No. 5. pp. 231-233.

ESTAS & SAMBON (M.). Note préliminaire sur le traitement de la pneumonie de l'indigène par la diathermie.—*Bull. Méd. du Katanga.* 1931. Vol. 8. No. 2. pp. 38-39.

IEGER (Marcel), VASSAL (Pierre) & FAUCONNIER (Jean). Modifications du chimisme sanguin sous l'influence de la cure hydro-minérale d'Encausse-Thermes.—*Bull. Soc. Path. Exot.* 1931. Mar. 11. Vol. 24. No. 3. pp. 222-229. [8 refs.]

DE MELLO (Froilano). O fomento das Novas Conquistas e suas relações com os problemas de assistência e saneamento. Memória apresentada ao 3.º Congresso Colonial Nacional reunido em Lisboa em 1930.—*Arquivos da Escola Méd.-Cirurg de Nova Goa.* Ser. A. 1931. No. 6. pp. 805-813.

NOCHT (B.). Chemotherapy in Tropical Diseases.—*Malayan Med. Jl.* 1931. June. Vol. 6. No. 2. pp. 38-42.

REVIEWS AND NOTICES.

CARTER (Henry Rose) [M.D., Assistant Surgeon-General (retired) U.S. Public Health Service]. **Yellow Fever. An Epidemiological and Historical Study of its Place of Origin.** Edited by Laura Armistead CARTER and Wade Hampton FROST.—pp. xii +308. With 5 figs. (3 maps). 1931. Baltimore: The Williams & Wilkins Company. [26s. 6d.]

The history of yellow fever has attracted the attention of many historians, culminating in the encyclopedic work of BÉRENGER-FÉRAUD published in 1890. During the last forty years, however, such far-reaching changes have occurred in our knowledge of this and other diseases that it is very desirable that the accounts of earlier epidemics should be re-examined in the light of new facts in the epidemiology of yellow fever.

The author, after retiring from the United States Public Health Service, devoted the last three years of his life, up to 1925, to the preparation of an account of the early history of yellow fever. This account has been prepared for publication by L. A. CARTER and W. H. FROST, and constitutes a most interesting and valuable contribution to the literature on the subject.

The first part of the book is devoted to a general account of the epidemiology of yellow fever, including the conditions necessary for the continued existence of the disease. The possibility of its dispersion, linked up with the conditions affecting the distribution of its transmitting host *Aedes aegypti*, is shown to depend on a variety of details among which temperature and sociological conditions seem to be the most important. The second part is concerned with diseases which have, or might have, been confused with yellow fever in the past. The most striking omission from this list is Weil's disease, which, in view of recent studies in South America, must have been one of the most common sources of confusion. It should be noted, however, that the treatise was written before the importance of this disease was realized.

The third part, comprising three-quarters of the book, contains a detailed study of the place of origin of yellow fever, including the historical evidence on this subject, dating back to the codices of ancient Mexico, and the earlier Spanish writings of the sixteenth century, which leads the author to the conclusion that the disease did not occur in America prior to the epidemic of 1648 in Yucatan.

After discussing many of the early American epidemics, the author describes some of the early records of sickness on the West African coast, and shows that many of these might well have been yellow fever. The positive evidence is not very convincing, but there are many reasons for considering this region to be the place of origin of the disease. The insect vector, *Aedes aegypti*, has many related species in West Africa and the Old World, but none in America; therefore the biological evidence is in favour of West Africa being the original home of the yellow fever mosquito, whence it has been carried to ports and become established wherever the requisite conditions of climate and breeding places were found.

Moreover the African negro, although contracting yellow fever as readily as other races, has it more mildly and rarely dies of it, his reaction being what one would expect in a race exposed to the infection for many generations. Consequently the author is of the opinion that the available biological evidence is altogether in favour of an Old World—West African—origin of yellow fever, and this is wholly consistent with the historical evidence.

E. Hindle.

ROCKEFELLER FOUNDATION. **Annual Report 1930** [MASON (Max), President].—380 pp. With numerous illustrations. New York: 61 Broadway. [Review appears also in *Bulletin of Hygiene*.]

The report of the Rockefeller Foundation for 1930 is, like its predecessors, full of interest. Much of the work there briefly and modestly referred to has been already recorded in greater detail in various scientific periodicals and those dealing with hygiene or disease in the tropics have been summarized in the *Bulletin of Hygiene* or the *Tropical Diseases Bulletin*, but the report gives succinct accounts of the subjects and brings together again points which may have escaped the notice or slipped the memory of those who read the fuller articles on their first appearance.

Yellow fever takes a foremost place; a short description of its investigation from the historical aspect is followed by an account of what has been done in West Africa and in South America by American and British workers, mainly under the direction of Dr. BEEUWKES. Malaria research and control in Bahia and Rio Grande do Norte, Brazil, in the Peruvian Andes, the Philippines, Jamaica, Porto Rico and elsewhere are brought to notice, and the developments in hookworm control, in nutrition problems and pellagra are recorded. At the end of each section is a useful list of papers written by members of the staff or those assisting in the work in question.

Dealings with actual disease direct form, however, but a part of the Foundation's activities. The educational assistance given must lead to inestimable advantage; mention may be made of some of the benefits conferred: the establishment and maintenance of Fellowships in different countries, the interchange of professors, aid to state and local health administrations, training of health workers, assistance to schools and institutes of hygiene and public health, to schools of nursing, capital grants to established institutions. The social services benefit largely and the humanities also by grants for research and bibliographical study, in England, France, Germany, Greece and elsewhere—in short benefactions scattered with unstinting hand from a fund administered with a view to producing the greatest good to the greatest number.

H. H. S.

DUGDALE (J. N.) [M.B., Ch.B. (Edin.), etc.]. **Health in Hot Climates.** 2nd Edition.—189 pp. 1931. London: John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, W.1. [5s.]

The author states in his preface that this book "has been written for those going out to the tropics for the first time" and to serve as a first aid, with advice regarding immediate treatment. Under the former one would naturally look for information as to the effects, physiological and pathological, of tropical climates, for advice on clothing, cleanliness, prevention of chill, risks of venereal disease, etc., on the choice of site and aspect of a house, on mosquito-proofing, furniture, care of quarters and annexes, supervision of servants from a health point of view, storage and preservation of food, disposal of refuse. Many of these receive no mention at all, others are disposed of in a few lines, for example a dozen or so on the important subject of clothing: "In the warm period of the day wear light clothing and as few as circumstances may require." "A most important reason to protect while sleeping is around the waist, which should be covered with a folded blanket." The first statement is not very helpful, while, as regards the second, an ordinary cholera belt is irksome enough on a hot night, a folded blanket would be intolerable. Of the mosquito net we are told to "see that it is carefully adjusted by your

servant before nightfall," no word as to shape, size of mesh, and mode of adjustment.

Much of the advice on first aid in emergencies is on the usual lines, but much extraneous matter is included, e.g., the theory of causation, the course, symptoms and treatment of dengue; the question as to whether Marcus Aurelius died of smallpox, whether leprosy and smallpox existed in ancient Egypt; the treatment of strabismus in children. In the chapter on yellow fever are statements which should not appear at the present day: "The causal organism . . . is a leptospira" is a theory disproved for some years now, and "it is now possible to be inoculated against yellow fever, and the results have been very satisfactory" has not stood the test of time. "Typhoid fever," the author states in a brief chapter treating of typhus and typhoid together, "is unfortunately still common in England," but two pages later, "cleanliness and hygiene have completely destroyed typhus, and with inoculation have almost as completely made typhoid disappear." Several other quotations might be given, but these must suffice.

The whole book gives one the idea of worked-up notes of a by-gone day, taken during a course of tropical medicine, and we see that the author is styled "Graduate of the London School of Hygiene and Tropical Medicine," although the school does not confer degrees.

H. H. S.

SOCIEDAD ARGENTINA PATOLOGIA REGIONAL DEL NORTE. **Sexta Reunión . . . celebrada en Salta los días 29 y 30 de septiembre y 1 de octubre, 1930. Dedicada a conmemorar el cincuentenario del descubrimiento del parásito del paludismo por Laveran.** [Sixth Meeting of Pathological Society of Northern Argentine.]—pp. xx+880. With numerous illustrations. 1931. Buenos Aires: Imprenta de la Universidad.

The report of the Sixth Congress of the Argentine Pathological Society, held in Salta in September and October, 1930, makes an imposing volume. Professor Salvador MAZZA, the President, introduces the work and Professor FRANCHINI follows with an article on the life and work of Laveran. The bulk of the volume, nearly 900 pages, contains the various papers contributed, 73 in all. They are divided into 9 sections. The first, Mycological, includes 18 papers on Dermophytes, Monilia, Maduromycoses; the second, with 6, on Microbiology and Experimental Biology, three of them dealing with yellow fever (see this *Bulletin*, Vol. 28, p. 724); section three contains 7 papers on Malaria and Haematology, 5 by Professor MAZZA, one each by Professor MÜHLENS and BARBIERI (see this *Bulletin*, Vol. 28, p. 990); other sections are on Dermatology, including leishmaniasis and syphilis, 11 papers; Entomology 5 papers, Hygiene 6, Parasitology, human and comparative, 11, Historical 4, and a miscellaneous section. It is clearly impossible to review so large a number of papers, nor is it necessary since a certain proportion of them, like many congress articles, though serving the very useful purpose of stating the position of the subject in question and summing up the researches already carried out, do not contribute any fresh knowledge; others which have been published elsewhere have already been dealt with by special abstracts in this *Bulletin*, while others, again, will be reserved for future summary. The whole is well printed; plates, photographs and microphotographs are well and clearly reproduced; the papers generally are of a high standard, and afford an excellent testimonial to the vigour of the Society and the usefulness of the work it is doing. The report is worthy of a stronger binding.

H. H. S.

ABRAHAMS (Adolphe). **Diseases and Disorders of the Digestive Organs.**—110 pp.

FAGGE (C. H.). **The Acute Abdomen.**—92 pp.

MOLLISON (Wm. Mayhew). **Acute Otitis Media.**—71 pp. With 9 figs.

SOUTTAR (H. S.). **Radium and Cancer.**—64 pp. With 3 figs. & 3 diagrams. Pocket Monographs on Practical Medicine. F'cap. 8vo. 1932. London: J. Bale, Sons & Danielsson, Ltd. 2s. 6d. net each.]

These four little books are the vanguard of a number of similar volumes now in preparation. They are described as "pocket monographs on practical medicine" and vary from 64 to 110 pages. It is not stated for whom they are intended, but presumably for the general practitioner. The standing of the authors is a fair guarantee of the accuracy of the information given on the respective subjects.

A. G. B.

SERGEANT (Edmond) & SERGEANT (Etienne). **Vingt-cinq années d'étude et de prophylaxie du paludisme en Algérie.** [Twenty-Five Years of Study and Prophylaxis of Malaria in Algeria.]—326 pp. With 148 figs. [Institut Pasteur d'Algérie. (n.d., n.p.)]

Here we have, reproduced from the *Archives Institut Pasteur d'Algérie*, a complete account of the antimalarial campaigns in Algeria from 1902 to 1926, for which the authors have been largely responsible. Much of the book is easily read, for of the chapter called General Conclusions, Epidemiological and Prophylactic, over a hundred pages are pictorial with just enough text to make a connected story. This part is naturally of more interest to the layman than the expert. Both the text and the 148 figures are well indexed and both are clearly printed. All students of malaria in the field will want to possess this book.

A. G. B.

NATIONAL MEDICAL JOURNAL OF CHINA. 1931. Aug.-Oct. Vol. 17. Nos. 4 & 5. pp. 393-686. With numerous illustrations. **Parasitology Number.**

The *National Medical Journal of China* makes its August-October issue a "Parasitology Number." This contains 22 articles on amoebiasis, trypanosomiasis, kala azar, filariasis and other helminth infestations, Anopheles, mycology. Strangely malaria is not represented. These articles will be reviewed in the appropriate section of this *Bulletin*.

A. G. B.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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[No. 4.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

MILAM (Daniel Franklin) & MELENEY (Henry E.). **Investigations of *Endamoeba histolytica* and Other Intestinal Protozoa in Tennessee: II. An Epidemiological Study of Amoebiasis in a Rural Community.**—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 325–336. [2 refs.] [State Dept. of Public Health, & Dept. of Preventive Med. & Public Health, Vanderbilt Univ., Nashville, Tenn.]

An intensive study of a rural community in Jackson County, Tennessee, comprising 75 families and 374 individuals. This community, a pioneer type of social organization, had limited contact with the outside world, existed mainly on its own crops, and had no privy sanitation. 38 per cent. harboured cysts of *E. histolytica*, and other intestinal protozoa in proportionately high percentages. Clinical dysentery had occurred in about one-fourth of the population during the past ten years, but the attacks simulated bacillary rather than amoebic dysentery. No correlation was found between occurrence of dysentery and harbouring of *E. histolytica*. Other symptoms possibly referable to amoebiasis were found to be as common among non-carriers as among carriers of *E. histolytica*. The findings indicated that infection with *E. histolytica* did not warrant special public health measures to bring about its immediate reduction.

H. M. Hanschell.

TAO (S. M.). ***Entamoeba histolytica* Infection in North China. A Study of 1,000 Positive Cases.**—*Nat. Med. Jl. China.* 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 412–434. [50 refs.] [National Epidemic Prevention Bureau, Peking.]

A study of the incidence of *Entamoeba histolytica* infection in Peiping (Peking) in patients from N. China (temperate zone).

Among 36,483 examinations made on 9,533 hospital patients—average 3.8 examinations per caput—1,000 were found infected with *E. histolytica*, i.e., 10.49 per cent. positives. Sex and nationality had

no influence on infection rate. Children under 4 years of age showed the lowest percentage of infection, which increased with age. A relationship between infection with *E. histolytica* and a definite age group above 5 years of age could not be established. More than half—i.e., 692 out of 1,000—were carriers, of which 449 (44·90 per cent.) were healthy carriers, and 243 (24·30 per cent.) were convalescent carriers. From the age of five upwards practically persons of all ages could act equally as carriers. 308 persons were found to show signs or symptoms of amoebiasis. No age group was singled out for susceptibility to the disease. There was no racial immunity. Only 4·30 per cent. showed symptoms of dysentery and 6 per cent. those of diarrhoea ; but 17·40 per cent. showed mild symptoms of abdominal pain, discomfort, constipation. Included in this figure were 18 cases of amoebic abscess of liver, 2 cases of amoebic abscess of lung, and 11 cases of mixed infection with bacillary dysentery.

H. M. H.

GRUBMANN (M. S.). Ueber Amöbendysenterie in Baku. [**Amoebic Dysentery in Baku.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Aug. Vol. 35. No. 8. pp. 462–467. With 2 charts in text. [Hosp. for Acute Infectious Diseases, Baku.]

The disease is very common. Of 1,420 patients, the faeces of 149 (10·4 per cent.) showed vegetative and encysted forms of *E. histolytica* ; and those of 107 (7·53 per cent.) encysted forms. The author is confident that these figures will prove to be higher still when the faeces of all patients are examined.

H. M. H.

i. SIMIC (Tshedomir). Présence de l'*Entamoeba dispar* Brumpt dans le sud de la Yougoslavie (Macédoine serbe). [*E. dispar* in **Southern Yugoslavia.**]—*Ann. Parasit. Humaine et Comparée.* 1931. July 1. Vol. 9. No. 4. pp. 289–302. [7 refs.] [Hyg. Inst., Skoplje, Yugoslavia.]

ii. ——. Infection expérimentale de l'homme par *Entamoeba dispar* Brumpt. [**Experimental Infection of Man with *E. dispar*.**]—*Ibid.* Sept. 1. No. 5. pp. 385–391. [5 refs.]

i. In this interesting paper the author records his extensive and careful observations and experiments. Each year he has noted sporadic cases of amoebic dysentery in Skoplje and neighbourhood ; although amoebic dysentery is rare, more than 17 per cent. of the people are carriers of an amoeba with 4-nuclear cysts morphologically identical with those of *Entamoeba histolytica*. The author has studied this amoeba, in culture, from 12 different persons who had never had dysentery. Of these 12 strains, 7 were inoculated in 7 series into 42 young cats—6 cats for each series. None of the cats was over 600 grams in weight and in all the anus was closed for 48 hours. They were inoculated either directly with human faeces containing cysts and vegetative forms, or with cultures. Only two cats were infected ; one in the second series and the other in the 5th series and in both cases with cultures. The amoebae in stools of the infected cats, as well as with their cultures, failed to infect three other cats. The two strains with which the two cats were infected, were also injected into the rectum of 4 human volunteers ; they were not infected with the

amoeba but did become infected with the *E. coli*, *Endolimax nana* and *Trichomonas intestinalis* injected at the same time.

The author concludes that this non-pathogenic amoeba infesting 17 per cent. of inhabitants of Skoplje can be none other than the *Entamoeba dispar* of Brumpt (1925), and that *E. dispar* is not a normal inhabitant of the human rectum [see this *Bulletin*, Vol. 23, p. 35].

ii. The author has succeeded in infecting 6 human beings with this "*E. dispar*," and despite frequent purgations, fatigues and changes in diet, imposed on the experimentally infected subjects, no illness resulted. The amoeba did not become pathogenic. At each passage in man the amoeba was inoculated into kittens; no kitten became infected.

H. M. H.

KHOURI (J.). L'amibiase extra-intestinale. [**Extra-intestinal Amoebiasis.**]—*Rev. Prat. Malad. des Pays Chauds*. 1931. July. Year 10. Vol. 11. No. 7. pp. 329-330.

Dr. Khouri once more records that his five years unrelenting search for the dysentery amoeba in urine and sputa has failed to reveal any case of amoebic bronchitis, nephritis or cystitis, in Alexandria, where others have so often reported it that Alexandria should be the world's focus of extra-intestinal amoebiasis. [But then Dr. Khouri has shown that he not only knows amoebae but is also acquainted with, and in fact practises, that technique which alone can surely demonstrate them.]

II. M. H.

GRASSO (Rosario). Sul problema dei portatori di "Entamoeba histolytica." [**Carriers of Entamoeba histolytica.**]—*Policlino. Sez. Prat.* 1931. Sept. 28. Vol. 38. No. 39. pp. 1425-1429. [1 ref.] [Inst. of Clin. Med., Univ., Catania.]

The author examined the fresh faeces of 60 patients to whom had been given a purgative dose of sodium sulphate, with a view to determining the numbers harbouring *E. histolytica*. He selected those who presented no signs of any intestinal disease. Four were found to be cyst-passers and 17 others passed vegetative forms, making 21 in all or 35 per cent. He also examined the faeces of the daughter and 3 sons of a patient with amoebic hepatitis and found all the sons to be carriers; of two children of a patient with acute amoebic dysentery, one was positive, and of the 4 children, a daughter and 3 sons, of one of the 60 above mentioned who proved to be excreting the vegetative form, the daughter and one son were positive. The hospital draws its clinical material from the lowest social classes among whom hygiene is conspicuously defective. [Stress is laid in the article more than once on the fact that 10 of the positive cases were suffering from abscess of the lungs, but no valid deduction can be drawn from this seeing that 23 of the 60 patients selected were suffering from pulmonary or pleural affections.] See also this *Bulletin*, Vol. 9, p. 404; Vol. 11, p. 49 and Vol. 18, p. 175.

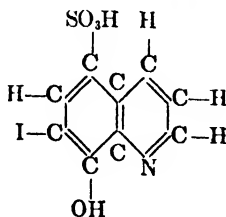
H. H. S.

- i. FAUST (Ernest Carroll). **The Diagnosis of *Endamoeba histolytica*.**—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 61–64. [12 refs.] [Dept. of Trop. Med., Univ. of Louisiana, New Orleans.]
- ii. O'CONNOR (F. W.). **The Treatment of Amoebiasis with Anayodin.**—*Ibid.* pp. 64–67. [Presbyterian Hosp., Columbia Univ., New York.]
- iii. THONNARD-NEUMANN (Ernst) & VALERA (Francisco). **Treatment of Amoebiasis with Preparations of Iodo-Oxy-Quinolin Sulphonic Acid.**—*Ibid.* pp. 68–76. [United Fruit Co. Hosp., Santa Marta, Colombia.]
- v. BREWSTER (K. C.). **Increase of Amoebiasis during the Rainy Season in Puerto Cortez, Honduras.**—*Ibid.* pp. 77–79. [Cortez Development Co. Hosp., Puerto Cortez, Honduras.]
- v. FLETCHER (L. R.). **Amebic Dysentery with Liver Abscess—Case Reports. (Treatment of Abscess by Aspiration.)**—*Ibid.* pp. 80–81. [Truxillo Railroad Co. Hosp., Puerto Castilla, Honduras.]

i. The author briefly recounts his extensive experience in microscopical examination of faeces and declares that three examinations, made by a careful worker, capable of recognizing the differential characteristics of *E. histolytica*, may, with a certain technique, determine with reasonable sureness the presence or absence of *E. histolytica*.

The technique is:—(1) As fresh faecal material as can be obtained—sometimes best obtained by proctoscope; (2) Small portion of faecal material thoroughly mixed with drop or two of physiological salt solution on oil free clean slide; (3) Smear should be 25 mm. wide and 50 mm. long; (4) Clean 22 mm. cover slide is placed on right hand half of film; (5) Small drop of Donaldson's iodine (saturated solution of iodine in 5 per cent. aqueous KI) is then added to left hand portion and thoroughly mixed, and this portion of film is covered with a cover slide.

ii. Ernst Bischoff, its manufacturer, gives the formula of anayodin as Iodoxyquinolin sulphonic acid with the addition of 22 per cent. sodium bicarbonate: empiric formula $C_9H_6INSO_4$.



Each 4 grain anayodin pill contains $3\frac{1}{10}$ grains iodoxyquinolin sulphonic acid and $\frac{1}{10}$ grain of sodium bicarbonate. The sod. bicarb. is added to increase solubility, not for any therapeutic action.

Iodoxyquinolin sulphonic acid contains 28 per cent. iodine, so in each pill there is 0.896 or practically $\frac{1}{10}$ grain of iodine. This iodine is so firmly fixed that no trace of free iodine can be found in anayodin pills, powder, or solution. The pills are enteric coated to protect them from gastric fluids and permit them to enter the small intestine unchanged. In the present series 51 cases have been studied. Four anayodin pills were given with meals, thrice daily, for eight days. One case complicated by bacillary dysentery (Flexner Y type), admitted to

hospital in prostrate condition, died. One patient relapsed after anayodin treatment, but recovered completely after a second treatment with anayodin. 49 patients treated with anayodin were observed for 6 months to two years, during which time no free or encysted amoeba was found in the stools. Amoebic abscess of liver appears to be unaffected by anayodin given orally; the drug probably exercises direct action on parasites in gut only. Administration of the drug is attended by no unpleasant symptoms.

iii. The authors record their experience in treating 25 cases of amoebiasis with anayodin and 30 cases with yatren. Details of each series are carefully and clearly set out in tabular form. The authors found that in chronic amoebiasis and chronic amoebic dysentery, iodoxyquinolin sulphonic acid (yatren 105, and anayodin) possess advantage over other forms of treatment. Prompt disappearance of vegetative, precystic, and cystic forms of *E. histolytica* is soon followed by relief of gastro-intestinal symptoms. Blood, pus, mucus, if present, quickly vanished, as did tenesmus and colic. Diarrhoeic stools soon became soft and later firm. Many patients previously constipated emphasized the fact that even after cessation of treatment normal regular evacuations continued. No toxic symptoms were noted even after prolonged use of the drug. No severe restriction of diet was necessary, and only exceptionally were more than 9 pills daily required. Patients were freed from their infection, safely, in a short time, and without much personal discomfort or loss of working days.

iv. A community of 6,000 people showed a rate of infection of 25 per cent., in hospital and dispensary cases, at end of dry season. Drinking water was only rarely boiled. Raw vegetables and raw milk were consumed. Sanitary conditions were very primitive. Rainfall increased from 5.26 inches per month (September) to 18.67 inches average per month during October to January inclusive. The rate of amoebic infection increased with rainfall, reaching a peak of 69.45 per cent. of all specimens examined during December, and dropped to dry season rate in the first half of February.

v. Two cases; in each, besides aspiration, bismuth subnitrate was given by mouth and emetine hydrochlor. hypodermically. Both made good recoveries.

H. M. II.

CHEN (S. M.), VAN GORDER (G. W.) & YUAN (Y. K.). **Amoebic Abscess of the Liver. A Study of Forty-Eight Cases with Particular Attention to Treatment.**—*Nat. Med. J. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 393-411. With 6 figs. (5 on 4 plates). [21 refs.] [Peiping Union Med. College, Peking.]

Full clinical records and careful study of the cases. Five were foreigners and 43 Chinese. The average age was 35.5 years. The youngest was 17 years old and the oldest 65. Four per cent. of cases occurred in females. Pus aspirated from thirty three out of forty cases in which cultures were made yielded no pyogenic organisms. Pus aspirated from twenty-six out of forty cases in which search was made contained motile *Entamoeba histolytica*. Seventy-one per cent. of the cases gave definite history of dysentery at some time in the past. Fever and sweats with pain in liver region and bulging mass in right hypochondrium occurred in the majority of cases. In all except one

the abscess was in right lobe of liver. The total mortality of the series was 20·8 per cent. ; 32 per cent. for cases operated on and 9·9 per cent. for the non-operated. Aspiration with administration of emetine had proved the method of choice. Use of yatren should receive further consideration.

H. M. H.

ENGSMAN (Martin F.) Jr. & MELENEY (Henry E.). **Amebiasis cutis** (*Endameba histolytica*). **Report of Two Cases.**—*Arch. Dermat. & Syph.* 1931. July. Vol. 24. No. 1. pp. 1-21. With 28 figs. (9 coloured on 1 plate). [11 refs.] [Med. School, Washington Univ., St. Louis, & Med. School, Vanderbilt Univ., Nashville, Tenn.]

A careful and well illustrated study of two cases in which ulcers involving the skin and deeper tissue of the abdominal wall were found to contain amoebae having the morphological characteristics of *E. histolytica*. One was secondary to an operation for resection of a portion of the colon involved in an amoebic ulceration. The other followed drainage of an amoebic abscess of the liver.

In Case 1 typical *E. histolytica* were found in smears and sections from biopsy of an ulcer of the skin. The resected colon showed an ulcerative process, typical of amoebiasis, but characteristic amoebae were not absolutely demonstrable in the sections.

In Case 2 typical *E. histolytica* were found in sections from biopsy of an ulcer of the skin and in autopsy sections from the floor of the ulcer, from the subcutaneous fat, from muscle tissue of the abdominal wall, from the abscess of the liver and from small ulcers in the colon.

Clinically the amoebic ulcers of the skin showed a rapidly spreading ulcerative process, activity of which varied in different parts of the margin ; a border presenting an irregular outline as the result of varying rapidity of ulcer progress ; an overhanging ledge of dying epidermis from under which pus could be expressed ; an advancing halo beyond ulcer margin which varied in colour from dusky red till it merged into the colour of normal skin ; extreme pain on pressure ; floor of ulcer composed of indolent granulation tissue covered irregularly with débris and pus.

H. M. H.

MARWITS (E. I.) & VAN STEENIS (P. B.). **A Case of Amebiasis Cutis after Incision of a Pericecal Abscess.** (*Phagédénisme cutané amibien.*)—Reprinted from *Urol. & Cutaneous Rev.* 1931. Vol. 35. No. 5. 4 pp. With 2 text figs. [16 refs.]

This case occurred in Java. The patient gave no history of dysentery. He was a drinker and confessed to lues. No amoebae or cysts were found in faeces. In scrapings from the large spreading undermined necrosing ulcer in skin and subcutaneous tissue over the caecal region amoebae were demonstrated. BRUG considered these amoebae typical *E. histolytica*. Irrigation of lesion with rivanol solution proved ineffective. In course of the illness thrombo-phlebitis of right thigh developed. Complete cure followed emetine injections. The authors surmise that an intestinal amoebiasis caused a perforating ulcer in or near the caecum resulting in pericaecal abscess which spread to front abdominal wall. Observation of this cutaneous amoebiasis showed a fulminating excentric extension of necrosis by continual renewal of infiltration of the walls of the ulcer, followed by necrosis ; giving an idea of what perhaps takes place in amoebic abscess of the liver.

H. M. H.

GUNN (Herbert) & HOWARD (Nelson J.). **Amoebic Granulomas of the Large Bowel : their Clinical Resemblance to Carcinoma.**—*Jl. Amer. Med. Assoc.* 1931. July 18. Vol. 97. No. 3. pp. 166–170. With 8 text figs. [9 refs.]

A valuable and well illustrated study of three cases of amoebic granuloma of the large bowel. The pathological process consists in persistence of an isolated chronic ulcer with progressive erosion of the wall of the bowel. In response to the amoebic ulceration and secondary infection, large amounts of oedematous fibrous granulation tissue appear. This process affects the entire bowel wall and the neighbouring mesocolic fat. As consequence, tumour masses are formed. These amoebic granulomas may easily be mistaken for carcinoma, for they give symptoms, physical signs and radiologic appearances that may be identical with those produced by carcinoma. *E. histolytica* is world wide in its distribution, and infections with it do not necessarily produce diarrhoea or dysentery.

H. M. H.

DE MELLO (Froilano). **Considérations à propos de la cystite amibienne.**—[**Amoebic Cystitis.**]—*Arquivos da Escola Méd.-Cirurg. de Nova Goa.* Ser. A. 1931. No. 6. pp. 761–766.

The author's case occurred and was studied in 1926 : he now reports it. A youth developed haematuria with pain and frequency of micturition. No gonococci were found and there was no recto-vesical fistula. Fresh urinary deposit showed, by microscope, amoebae. Wet fixed smears stained by iron-haematoxylin and eosin, revealed, besides typical haematophagous leucocytes, other cells whose cytoplasm and nuclear structure were identical with those of the dysentery amoeba. Furthermore the urinary deposit inoculated into a cat's rectum—anus then closed for 24 hours by collodion tampon—produced in the cat an acute and mortal dysentery. The ulcerated intestine at autopsy yielded many typical amoebae, which were studied in wet fixed and iron haematoxylin stained smears. Lastly, the cystitis was rapidly cured by emetine injections. Later there was a slight relapse, again quickly cured by emetine, and now it was found that the patient who had never had dysentery, was a carrier of cysts of the dysentery amoeba. His stools inoculated into cat's rectum produced a fatal dysentery in the animal.

H. M. H.

GOWANS (F. J.). **Thrombo-Phlebitis Migrans. A Case traced to Chronic Infection with *Entamoeba histolytica*.**—*Jl. Roy. Nav. Med. Serv.* 1931. July. Vol. 17. No. 3. pp. 212–213. [1 ref.]

During 6 months' repeated attacks of thrombo-phlebitis search in tonsils, teeth, sinuses and every other usual source of infection proved negative. Faeces examination revealed numerous cysts of *E. histolytica*. There was no history of dysentery or diarrhoea. After emetine, E.B.I., and yatren ; cysts disappeared from stools and no further phlebitis occurred. [Compare MARWITS & VAN STEENIS case, above, p. 254.]

H. M. H.

ANDERSON (W. E.). **The Treatment of Entamoebic Dysentery by Duodenal Injection of Ipecac.**—*New Orleans Med. & Surg. Jl.* 1931. July. Vol. 84. No. 1. pp. 46–48.

Frequent lacto-farinaceous feeds ; then after twelve hours' fast a duodenal tube is passed well into the duodenum, its location determined

preferably by X-ray; closure of pylorus is encouraged by giving 4 to 5 oz. cold milk alongside of tube; then transduodenal lavage—500 cc. of a 10 per cent. aqueous solution of sodium and magnesium sulphate—run slowly into duodenum; this usually produced a copious watery evacuation in 30 minutes, cleaning the ulcer bases; twenty minutes after giving salt solution, 1 dram powdered ipecac. in 100 to 200 cc. warm water is poured down the tube, followed by 50 cc. more of water to wash out the tube; the tube is left *in situ* for few minutes as in its removal a little ipecac. might be carried into stomach and occasion persistent vomiting; one hour later patient resumes feeds. This treatment is repeated daily for seven days; then after a rest for seven days another seven days' intubation treatment. The author declares that in the 6 cases thus treated symptomatic improvement was noted 24 hours after first treatment, and in most cases stools remained negative for both amoeba and cysts. [This type of treatment appeared very logical to the author, and that it was not uncongenial to at least one patient is shown by his return for more. Is there not here a method to be tried before resort to -ostomy?]

H. M. H.

BIGGAM (A. G.), HALAWANI (A.) & RAGAB (A.). **The Treatment of Amoebic Dysentery by Oral Yatren.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 209-210.

A study of cases in Cairo. Each pill contained 0.25 gram yatren. Two pills t.i.d. failed to bring about any definite improvement. Three pills t.i.d. for same period of time gave beneficial results. Best results were obtained by four pills t.i.d. for 15 consecutive days.

Of 37 patients treated by the last method no curative effects were observed in 2: symptoms, and vegetative forms of *E. histolytica* persisted at the end of the course. Satisfactory tests to determine permanence of cure could be carried out only in 18 of the 37 cases; of these 13 (72.2 per cent.) were found to be apparent cures, 5 were failures. The other 17 cases must be classified as uncertain, but in these complete relief from dysenteric symptoms had been obtained at end of a course of treatment.

As far as could be detected by sigmoidoscopy amoebic ulceration of rectum had generally completely healed by end of the course. Diarrhoea often persisted, being kept up by the drug, and subsided only on its discontinuance.

H. M. H.

BROWN (Philip W.) & OSTERBERG (Arnold E.). **Toxicity and Rate of Elimination of Organic Arsenicals (Stovarsol and Treparsol) in the Treatment of Endamebiasis.**—*Amer. Jl. Med. Sci.* 1931. Aug. Vol. 182. No. 2. pp. 257-261. [10 refs.]

The authors' data tend to show that treparsol is more rapidly eliminated than stovarsol and is therefore probably the safer drug.

H. M. H.

RATCLIFFE (Herbert L.). **A Comparative Study of Amoebiasis in Man, Monkeys and Cats, with Special Reference to the Formation of the Early Lesions.**—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 337–352. With 13 figs. on 4 plates. [15 refs.] [Med. School, Univ. of Pennsylvania, & Lab. of Comp. Path., Philadelphia Zool. Soc., Philadelphia.]

This study of the histology of intestinal amoebiasis in monkeys belonging to two S. American genera (*Ateles*, *Lagothrix*) showed that the first lesions were superficial erosions of the mucosa. These were followed by development of undermining ulcers whose origin was the solitary lymph follicles of the large gut. When tissue was fixed immediately after death the amoebae were seen in the mucosal lesions but not in the submucosa. Apparently the rôle of the amoebae was superficial destruction of the mucosa, which allowed pyogenic bacteria to invade the lymph vessels and produce submucous abscesses in the follicles, which ruptured into the intestine and formed undermining ulcers. When tissue is fixed 12 to 24 hours post mortem striking differences were seen—extensive necrosis of mucosa and deep invasion of gut wall by the amoebae, which were also found in large numbers in and about the ulcerated follicles; while the inflammatory reaction about the ulcers, prominent in fresh tissue, was not so striking. Leucocytes as well as the remnants of follicles had undergone degeneration. These changes were very similar to those described in human intestinal amoebiasis and probably originated in much the same way. Amoebae deep in the tissues in man might be accounted for by post mortem invasion, since descriptions are made from tissue fixed several hours after death.

The lesions of intestinal amoebiasis in the cat did not appear to be comparable with those in primates. In the cat there was direct invasion and destruction of gut wall by the amoebae, usually accompanied by inflammatory reaction of the whole wall, indicating bacterial as well as amoebic action. True undermining ulcers, comparable with those in primates, probably did not occur, and lesions presented as such seemed to have another explanation.

H. M. H.

FAUST (Ernest Carroll). **A Study of Canine Amebic Colitis.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 391–400. [15 refs.] [Dept. of Trop. Med., Tulane Univ., New Orleans.]

The author used fresh caecal material containing *E. histolytica* withdrawn through the rectum; this was inoculated into the posterior ileum, so that inoculum passed into the large bowel under conditions paralleling those in nature. Infection of 84 per cent. of 50 dogs was thus obtained, refuting the prevailing idea that the dog is an unfavourable subject for infection with *E. histolytica*. The symptoms of infection are essentially those occurring in man. By regulating the conditions, particularly diet, successive stages of acute, subacute, chronic, and probably "carrier" states of amoebic colitis can be produced and studied.

H. M. H.

BACILLARY DYSENTERY.

- i. ZIA (S. H.). **The Occurrence of Dysentery and Typhoid Antibodies in Joint and Pleural Exudates.**—*Nat. Med. Jl. China.* 1931. June. Vol. 17. No. 3. pp. 302–306. [5 refs.]
- ii. — & SMYLY (H. J.). **Arthritis in Association with Bacillary Dysentery. Report of Case and Discussion.**—*Ibid.* pp. 307–312. [11 refs.] [Peiping Union Med. College, Peking.]

i. Arthritis in a patient with recent history of bacillary dysentery. Agglutinins for *B. dysenteriae* in the joint fluid and a genito-urinary infection with gonococci were found. Joint fluid from the patient and pleural exudates in rabbits after active and passive immunization, were found to contain specific agglutinins of high titre. This seemed to be the result of rapid passage of these antibodies from blood to exudate.

ii. Full report and discussion of three cases of arthritis accompanying or following bacillary dysentery among 900 cases of that disease. In all the knee joints were the principal, and in two, the only joints affected. None showed eye lesions. All recovered with no permanent deformity or damage to affected joints. The authors declare that the association cannot be regarded as proved.

H. M. H.

- PERUZZI (Mario). **Some Cases of Intestinal Infection due to Castellani's Metadysentery Bacilli.**—*Jl. Trop. Med. & Hyg.* 1931. Nov. 2. Vol. 34. No. 21. pp. 358–360. [30 refs.]

The intestinal infections studied during 8 months were those caused by the principal metadysentery bacilli of CASTELLANI. That these infections do occur in Egypt is considered as proved. A number of the organisms were isolated. Affections caused by them were acute or chronic, febrile or non-febrile, dysenteric or non-dysenteric. The symptoms were rather indefinite "with occasional attacks of diarrhoea and at times irregular fever."

W. F. Harvey.

- NAKATOMI (Ikuma). Etude expérimentale sur l'anavaccin provenu des bacilles paratyphiques B et des bacilles dysentériques du type Shiga. [**Study of the Anavaccine from Paratyphoid B and Shiga Dysentery Bacilli.**]—*Sei-I-Kwai Med. Jl.* 1931. June. Vol. 50. No. 6 (544). [In Japanese. French summary pp. 10–12.]

Anavaccine, which is prepared by the action of formol and heat on a suspension of the organisms in normal salt solution, is compared with the corresponding anatoxin. The anavaccine is found to lose almost completely its original toxicity and to retain completely its antigenic power.

W. F. Harvey.

HÉRIVAUX (A.) & RAHOERSON (R.). Sondage épidémiologique sur les Shiga-infections au moyen de la séro-agglutination. [**Discovery of Shiga Infection by means of Sero-Agglutination.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 612-614. [Pasteur Inst., Antananarivo.]

The authors give an account of the discovery of Shiga-dysentery infections for the first time in Antananarivo by means of agglutination reactions of patients' sera.

W. F. Harvey.

ALEXEIEFF (A.). Sur la pseudo-pycnose des neutrophiles dans la dysenterie amibienne.—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 469-471.

ANDERSON (Hamilton H.) & REED (Alfred C.). Amebiasis. Comments on Various Amebicides. Report of Case.—*California & Western Med.* 1931. Dec. Vol. 35. No. 6. pp. 439-442. [2 refs.] [Pacific Inst. of Trop. Med., Univ. of California, San Francisco.]

ANTONELLI (Giovanni). Alcune considerazioni sopra un caso di ascesso del fegato guarito con la cura emetino-arsenicale.—*Policlinico. Ser. Prat.* 1931. Sept. 14. Vol. 38. No. 37. pp. 1352-1356.

BIGGAM (A. G.) & RAGAB (A.). Rupture of Amoebic Liver Abscess into the Peritoneal Cavity, Certain Points concerning its Diagnosis and Treatment.—*Jl. Trop. Med. & Hyg.* 1931. Sept. 1. Vol. 34. No. 17. pp. 285-287. [8 refs.]

BRINK (C. D.). Amoebic Dysentery with Acute Hepatitis.—*Jl. Med. Assoc. South Africa.* 1931. Oct. 24. Vol. 5. No. 20. pp. 675-676.

BROOKE (Percy A.) & GOODALE (Raymond H.). Amoebic Dysentery in Massachusetts. Report of Five Cases.—*New England Jl. of Med.* 1931. July 16. Vol. 205. No. 3. pp. 130-134. [5 refs.]

BROWN (J.). Amoebic Dysentery.—*Med. Jl. Australia.* 1931. Sept. 26. 18th Year. Vol. 2. No. 13. pp. 392-393.

DARGEIN & PLAZY. Amibiase pulmonaire pure; vonique; guérison rapide par l'émétine, maintenue et vérifiée ultérieurement.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. Nov. 9. Year 47. 3rd Ser. No. 29. pp. 1639-1642.

HICKEY (G. V.). Endemic Amoebic Dysentery.—*Med. Jl. Australia.* 1931. Oct. 24. 18th Year. Vol. 2. No. 17. p. 517.

HOUSIAU (F.). A propos d'irido-cyclite vraisemblablement en rapport avec une dysenterie amibienne.—*Bruxelles-Méd.* 1931. Nov. 1. Vol. 12. No. 1. p. 9.

HSU (I. T.). Amoebiasis of the Lungs.—*China Med. Jl.* 1931. Nov. Vol. 45. No. 11. pp. 1097-1101. [P. F. Bresee Memorial Hosp., Ta Ming Fu, Hopei.]

LEFROU (G.). Le diagnostic et le traitement de la dysenterie bacillaire en Afrique.—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 505-511. [5 refs.]

LITTLE (J. L.). A Case of Balantidium Dysentery in Canada.—*Canadian Med. Assoc. Jl.* 1931. Dec. Vol. 25. No. 6. pp. 653-657. With 5 text figs. [22 refs.] [Dept. of Path. & Bact., Univ., Toronto.]

MACDONALD (Ian). Amoebiasis in the Temperate Zone. Remarks on Seven Cases.—*Lancet.* 1931. Dec. 26. pp. 1404-1406. [15 refs.]

MAJUMDER (A. R.). The Use of Kurchi Alkaloids in the Treatment of Amoebiasis.—*Jl. Trop. Med. & Hyg.* 1931. Aug. 15. Vol. 34. No. 16. pp. 265-267. With 1 chart in text.

MARIN (Rafael A.). Preliminary Note on the Morphology and Pathogenicity of *E. histolytica* in P.R.—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 429-434. With 1 fig. [7 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

- DE MURO (Paolo). Alcune osservazioni sui bacilli metadissenterici di Castellani.—*Ann. d'Igiene*. 1931. May. Vol. 41. No. 5. pp. 309-317. With 2 text figs. [30 refs.] [Ross Inst. & Hosp. for Trop. Diseases, London.]
- MUSGRAVE (William F.), the late. [Edited by Alfred C. REED.] Amebiasis. A Clinical Study.—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 469-503. [Pacific Inst. of Trop. Med., Univ. of California, San Francisco.]
- OLMER (D.). De quelques hépatites amibiennes méconnues.—*Marseille-Méd.* 1931. June 5. Vol. 68. No. 16. pp. 697-705. [3 refs.]
- OLMER (D.), BOTREAU-ROUSSEL (P.) & BLANCHARD (M.). Accès grave de tachycardie paroxystique au cours du traitement éméthinien d'une dysenterie amibienne.—*Marseille Méd.* 1931. Feb. 25. Vol. 68. No. 6. pp. 279-282.
- PENINGTON (Raymond G.). Amoebic Hepatic Abscess in a New Britain Native.—*Med. Jl. Australia*. 1931. Aug. 15. 18th Year. Vol. 2. No. 7. pp. 199-200.
- PERUZZI (Mario). Le *Vibrio* *zevlanica* Castellani dans les dysenteries et dans les entérites à Alexandrie.—*Rev. Prat. Malad. des Pays Chauds*. 1931. Oct. Year 10. Vol. 11. No. 10. pp. 443-448.
- PETRIDIS (Pavlos). Le traitement chirurgical de la dysenterie et de ses complications locales.—*Rev. Prat. Malad. des Pays Chauds*. 1931. Aug. & Sept. Year 10. Vol. 11. Nos. 8 & 9. pp. 345-386; 395-433. [60 pp. text, remainder advertisements.] [Refs. in footnotes.]
- QUÉRANGAL DES ESSARTS (J.). La dysenterie amibienne autochtone au Port de Brest.—*Arch. Méd. et Pharm. Nav.* 1931. Oct.-Nov.-Dec. Vol. 121. No. 4. pp. 456-470.
- STALDER (H.). Zur Frage der chronischen Amöbendysenterie in unseren Breiten.—*Schweiz. Med. Woch.* 1931. July 4. No. 27. pp. 641-644. [16 refs.]
- STEFANO (Umberto). Contributo allo studio dell' amebiasi vescicale.—*Arch. Ital. Sci. Med. Colon.* 1931. Aug. 1. Vol. 12. No. 8. pp. 463-469. With 1 text fig. & 1 coloured plate. English summary. [Inst. of Colonial Path., Univ. Modena.]

LEPROSY.

LEPROSY REVIEW. 1932. Jan. Vol. 3. No. 1. pp. 1-46. With 6 figs., 3 maps & 1 plan on 4 plates. Quarterly Publication of the British Empire Leprosy Relief Association, 29 Dorset Square, London, N.W.1.

This publication deals chiefly with published work, but includes new information on the incidence and campaigns against leprosy in the Empire especially. In this issue the important campaign to eradicate the disease from the Southern Anglo-Egyptian Sudan is reported on by A. CRUICKSHANK, who records 1,556 cases, 2·8 per cent., discovered among the 58,136 of the Yambio district as the result of a survey of the entire population. An uninhabited area of 30 square miles has been reserved for a leper colony and within eighteen months 2,700 cases were admitted, housed and treated; a number which was increased to 3,220, or 5·3 per cent. of the population, after a second survey, so that 84 per cent. of the total cases are now segregated. In the Tambura district between 1927 and 1930, 2,123 were admitted to another leper settlement, and a further survey revealed 3,300 cases among 61,000 cases, or 5·5 per cent., mostly mild early cases suitable for treatment. At the time of writing no less than 4,800 out of the 6,500 found are segregated with land to cultivate so as to be largely self supporting. All the infectious cases are now isolated and treated and those left free are uninfected. This high incidence is fortunately mainly due to mild uninfected cases with a tendency to self-arrest before permanent damage has occurred, so he advises segregation and active treatment of only the infectious cases, and early ones should be watched and treated at clinics if symptoms become active. Improved social and dietetic conditions to raise resisting powers are the best prophylactic measure. This great effort to stamp out leprosy will be watched with much interest by all leprologists. Other articles are by N. E. WATSON on the much discussed subject of leprosy in Hawaii, by R. G. COCHRANE on work in Rhodesia and by E. MUIR on the well known anti-leprosy methods used in India.

L. Rogers.

CHINA MEDICAL JOURNAL. 1931. Sept. Vol. 45. No. 9. pp. 815-917. With 10 plates. **Leprosy Number.**

The issue of this special number is a striking testimony to the increased interest in the leprosy problem in recent years, but it is necessarily largely an epitome of already published work so only a few outstanding points need be dealt with here. Five of the articles deal with the prevalence of leprosy in three eastern provinces, Southern Yunnan, the Swatow district, Szechwan, and in the less known areas respectively. Koreans are found to be four or five times as much affected as Chinese and Japanese, and the disease has become more common in Manchuria with the recent immigration of hosts of Chinese. In Yunnan 240 patients have already been admitted to a leper colony. Swatow is said to have at least 30,000 lepers and the Kwantung Province several hundred thousand, for whom Missions are organizing clinics. In Korea three missions and one government institution provide for 2,500 of the many thousand lepers and some villages are financing dispensary treatment. An illustrated account of the very successful

leper colony in Korea is contributed by R. M. WILSON and an article on prophylaxis against leprosy by L. ROGERS urges repeated examination of all contacts to enable the earliest stages to be found and cleared up by early treatment. Numerous extracts from current literature are also given.

L. R.

LEPROSY IN INDIA. 1931. Vol. 3. Jan., Apr., July & Oct. Nos. 1, 2, 3 & 4. 171 pp. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

"Leprosy in India" is published by the Indian Council and four numbers for 1931 have been sent for notice. A number of further surveys are reported, which are mainly of local interest; extracts of current literature are also published.

L. R.

MUIR (Ernest). **Factors influencing the Endemiology of Leprosy in India.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 173-176. [School of Trop. Med. & Hyg., Calcutta.]

This short paper estimates the probable number of lepers in India, judged by numerous surveys already made, at between 500,000 and one million, but the majority of the cases are slight and uninfected. It is most prevalent in the poor lower social classes and castes, with overcrowding and promiscuous social and sexual habits, and among overcrowded industrial labour classes; among the latter, 12 per cent. of infections have been found, and the average rate is 1 to 2 per cent. Secondary helminthic and other infections and deficient diet favour infection, and improved transport aids its spread.

L. R.

ROBINEAU. La lèpre en Afrique Occidentale Française et sa prophylaxie. [**Leprosy in French West Africa and its Prevention.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 708-716. [2 refs.]

The results of this instructive survey are summed up in the following table which speaks for itself.

Colonies	Population examined	Number of lepers	Proportion per mille
Ivory Coast	?	1,000(?)	?
Dahomey	?	?	?
Guinea	1,359,295	2,757	2.02
Upper Volta	2,712,892	6,792	2.50
Mauritania	?	?	?
Niger	?	?	?
Senegal	1,136,223	1,587	1.39
Sudan	1,880,290	7,761	4.12
Totals	7,088,700	19,897	2.50

L. R.

EASMON (M. C. F.). **Notes on a Survey of Leprosy in Sierra Leone.**—*Sierra Leone Ann. Rep. Med. & San. Dept. for the Year 1930.* IX. Scientific. pp. 38–40.

The author mentions that Dr. WINTERBOTTOM'S 1796 book does not mention leprosy in this colony, but Robert CLARKE in 1843 recorded 34 cases in the Kissy hospital. By 1928 the number had increased to 129, and at this time BLACKLOCK saw 183 cases in the Northern Province and reported that the number "must be very large." The people do not fear or avoid lepers. So far the newer treatments have not produced rapid alleviation in the class of cases seen in the hospitals.

L. R.

DIXEY (M. B. D.). **Some Observations on Leprosy in the Gold Coast and British Togoland.**—*West African Med. Jl.* Lagos. 1931. July. Vol. 5. No. 1. pp. 3–5. [5 refs.]

The author has worked for some years as leprosy officer in this area, and he reports the lowest incidence among tribes in the western portion of the Gold Coast, who carry out some segregation, and the highest, over 21 per mille, in the Eastern Province and also much in the North. Of 4,000 known cases considerably over 2,000 are under treatment in 18 out-patient clinics and in a large settlement. The nerve type predominates. The Ho settlement in Togoland has 515 inmates out of 776 known cases or over 7 per mille of the population. In over one-half the disease was first noticed between the ages of 10 and 30, and in over three quarters between 10 and 40 as elsewhere in Africa. In 30 per cent. prodromata in the form of pain, fever, paraesthesia etc. preceded the initial lesion. Nine months' treatment of the 515 Ho cases showed various degrees of improvement in 461.

L. R.

AUSTIN (C. J.). **Report on Central Leper Hospital, Makogai.**—*Fiji Ann. Med. & Health Rep. for Year 1930.* pp. 58–63.

——. **Leprosy in Children. (A Study of 100 Cases in the Central Leper Hospital, Makogai, Fiji.)**—*Ibid.* pp. 63–68. With 1 fig. [4 refs.]

This report is by C. J. Austin, who has succeeded Dr. NEFF. The admissions numbered 73, 29 were discharged on parole and 51 died. An outbreak of dengue attacked all the staff, but none of the lepers. 59 cases have remained negative bacteriologically and clinically for twelve months after treatment.

In the same report a study of 100 cases in children is described.

L. R.

LAQUIÈZE. **Inspection médicale en Nouvelle-Calédonie. (Circonscription du Pont-des-Français).** [**Medical Inspection in New Caledonia.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 716–723.

A resurvey has been carried out in an area visited by LEBOEUF in 1912. The population was found to have declined from 392 to 254 and the percentage of well-marked and of suspected leprosy had fallen from 6.88 to 6.29 per cent.

L. R.

LIE (H. P.). La lèpre en Norvège. [**Leprosy in Norway.**—*Acta Dermato-Venerologica*. 1931. July. Vol. 12. No. 2. pp. 105-114. With 2 text figs. English summary.

This is an address to a tuberculosis conference on the well known history of leprosy in Norway, and its control by a humane form of segregation with very little compulsion. The cases have fallen from 2,858 in 1856 to only 68, among three million people, mostly old uninfected nerve cases. In the five years 1861-65, 1,040 lepers were found, but since 1925 only three new cases have been met with and the disease is likely soon to be stamped out after being prevalent for at least seven centuries.

L. R.

CARRILLO (Francisco), FERNÁNDEZ (José M. M.) & SCHUJMAN (Salomón). La lepra en Rosario. [**Leprosy in Rosario.**—*Semana Méd.* 1931. Dec. 24. Vol. 38. No. 52 (1980). pp. 1932-1938.

Judging from the authors' experience at the National Hospital and from visits to and enquiries at other sources, there were 170 lepers in Rosario in 1929. During 1930 they have seen 70 new cases. Clearly the numbers are increasing rapidly and investigation into the histories of the patients shows that 63 of 112 (59 per cent.) acquired infection locally. As regards age 18 per cent. were below 20 years, 55 between 20 and 50 years and 27 over 50 years. 63 per cent. were males, 37 females. The vast majority, 70 per cent., were Argentines; next came Italians, 22 per cent.

In order to take the matter in hand effectually, it is necessary first to make a census in the district; secondly, to organize treatment by establishing one or more leper colonies, a hospital and a dispensary; and thirdly, to help prophylaxis by educating the public.

H. H. S.

BADGER (L. F.). **Leprosy: a Study of the White Blood Cells and their Relation to Clinical Progress.**—*Public Health Rep.* 1931. Nov. 20. Vol. 46. No. 47. pp. 2782-2802. With 5 charts in text. [29 refs.]

The main results of this careful study of the leucocyte changes in 200 cases of leprosy are summarized in the following table.

A comparison of the average percentages of neutrophils, lymphocytes, and monocytes in the various stages of activity.

Stage				Number of cases	Neutrophils	Lymphocytes	Monocytes
					Per cent.	Per cent.	Per cent.
Acute reactions	...	...		10	80	15.8	3.6
Subacute reactions	...	...		6	70.8	24.7	3.3
Chronic reactions	...	...		8	65	29.5	2.6
Slow definite improvement	...	...		42	45.6	43.7	7
Quiescence	...	...	...	19	57.9	35.6	4

During acute and sub-acute reactions the polynuclears number from 70 to 80 per cent. and the lymphocytes 15 to 25 per cent.; in chronic reactions the differential count is about normal, but in cases showing improvement or quiescence the polynuclears number only 45 to 57 per cent. and the lymphocytes 35 to 43 per cent. Thus the progress of the case can be gauged, for in 85 per cent. of the cases the leucocyte indications and the clinical progress were in agreement. A count made on admission will furnish an index as to the stage and progress of the disease, and an increase in the polynuclears may give the first warning of an approaching exacerbation while a continued high lymphocyte figure indicates a good prognosis.

L. R.

HENDERSON (John M.). **A Note on the Formation of Leprous Nodules in the Human Skin.**—*Indian Med. Gaz.* 1931. Sept. Vol. 66. No. 9. pp. 483-484. With 5 figs. (4 coloured) on 3 plates. [3 refs.] [School of Trop. Med. & Hyg., Calcutta.]

In this well illustrated short paper the writer emphasizes that nodules arise around emboli of lepra bacilli in the deep layers of the skin. When stained by Levaditi's silver method, and counterstained with weak fuchsin, the nodules are clearly defined as orange coloured masses. The retrogression of a nodule under treatment shows in the reactionary phase breaking down and fatty degeneration of the lepra cells with invasion of the nodule by polynuclear leucocytes, and surface nodules may show liquefaction and discharge of the contents of the nodule. During resolution there is gradually increasing fibrosis, with sclerosis of the small blood vessels, disintegration of the lepra cells and progressive diminution of the acid-fast bacilli with a proportionate increase of the granular forms.

L. R.

AOKI (T.). Die frühzeitige Diagnose und Therapie der Lepra. [**Early Diagnosis and Treatment of Leprosy.**]—*Japanese Jl. Dermat. & Urol.* 1931. Nov. Vol. 31. No. 11. [In Japanese. German summary pp. 137-146.] [Dermat. Hosp., Nagasaki.]

The author considers the earliest sign of leprosy to be the superficial anaesthesia of MUIR, which is present in 99 per cent. of the cases. Deep analgesia, disturbances of heat and pain sensation and depigmented spots are other early signs. A rapid red-corpuscle sedimentation is also of value. He discusses the dangers of the iodide treatment, and advises intravenous injections of small doses, beginning with 1 cc. of a 5 per cent. solution, repeated in gradually increasing doses every 3 days. In the rare cases in which even 40 cc. doses produce no reaction it may be given orally up to 240 grains as advised by MUIR. In cases with strong reactions after iodides he gives 0.01 gm. per kg. of calcium chloride with 1-5 cc. of 20 per cent. sodium salicylate solution. For local application he advises either 5 per cent. chrysarobin or 5 per cent. ichthyol and 2 per cent. salicylic acid. Hot sulphur baths at 50° C. are also relied on in Japan.

L. R.

CANAAN (T.). Beitrag zur Behandlung der Lepra. [**Treatment of Leprosy.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Nov. Vol. 35. No. 11. pp. 643-654. [Refs. in footnotes.] [German Hosp., & Lepers' Home, Jerusalem.]

The author is convinced that the most certain method of treatment is by the chaulmoogra derivatives, by which the disease can often be curtailed in the sense of obtaining disappearance of the symptoms and of the bacillus with general improvement in health. In delicate persons, those with nephritis, advanced tubercle, anaemia, malaria, etc., the treatment is greatly handicapped. Potassium iodide is a very dangerous drug in leprosy, since aggravation, not controllable by subsequent treatment, may result from its use.

L. R.

DE RAYMOND (A.). Le traitement des lépreux au Tonkin par injections intraveineuses d'un savon total de chaulmoogra. [**Intravenous Injections of the Soap of Chaulmoogra.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1931. July-Aug. Vol. 9. No. 7. pp. 592-594.

PEIRIER. Soluté de chaulmoograte de soude pour injections intraveineuses.—*Ibid.* pp. 595-601.

——. Le principe actif des huiles de chaulmoogra.—*Ibid.* pp. 602-605. [Hyg. Lab., Hanoi.]

——. Les chaulmoogras du Petit-Lac.—*Ibid.* pp. 606-608.

Some chemical disadvantages of Rogers' original (1917) sodium gynocardate for intravenous use are pointed out, and various additions to overcome them are discussed. As the result of these, the following formulae, which proved innocuous on intravenous injection in rabbits, are recommended.

	I	II
Chaulmoograte of soda $\frac{1}{2}$ saturated	30 gm.	50 gm.
Antipyrine	28 gm.	25 gm.
Saccharose	51 gm.	47 gm.
Distilled water	1,000 cc.	1,000 cc.

Another formula is chaulmoograte of soda $\frac{1}{2}$ sat. 30 gm., antipyrine 26.5 gm., glucose or lactose 25 gm. and distilled water 1,000 cc.

L. R.

DE RAYMOND (A.). Essai d'un savon total de chaulmoogra dans le traitement de la lèpre. [**Chaulmoogra Soap in Leprosy.**—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 770-772.

——. Le traitement des lépreux au Tonkin par injections intraveineuses d'un savon total de chaulmoogra.—*Ibid.* pp. 780-783.

A three months' trial in twenty lepers of Peirier's sodium chaulmoograte solutions, described above, showed that they were suitable

for both intravenous, subcutaneous and intramuscular injection. The injections were painless and relieved nerve pain and also had a tonic effect. Rapid healing of ulcers, diminution of infiltrations and paralysis, fading of erythematous patches and clear signs of retrogression of the disease were obtained of a more satisfactory nature than with any other treatment, but more prolonged trials are necessary to allow of general conclusions.

L. R.

BOEZ (L.), GUILLERM (J.) & MARNEFFE (H.). *Traitement de la lèpre par les savons à base d'huile d'hydnocarpus. [Treatment by Chaulmoogra Soaps.]—Arch. Inst. Pasteur d'Indochine.* 1930. Apr. No. 11. pp. 27–32. With 10 figs. on 5 plates.

The authors consider that the introduction of the chaulmoogra soaps by "Roggers" was a definite advance on the oil, but he prefers to give it in the form of keratin coated pills, containing 0.30 gm. of the sodium chaulmoogrates, between meals, 4 to 10 or 12 pills a day. His photos show definite improvement.

L. R.

KINGSBURY (Jerome). **A New Antimony Compound in the Treatment for Leprosy.**—*Arch. Dermat. & Syph.* 1931. Dec. Vol. 24. No. 6. pp. 1053–1057. [8 refs.]

After references to CAWSON'S use of colloidal antimony for healing of leprosy ulcers, and to that of WILDISH on a trial at the Amatiklu Leper Institution of Zululand, the author records four cases of leprosy treated in New York with 3–3 diamino 4–4 dihydroxy arseno-stibino benzene, or M 303 for short. It is light brown, soluble in water and is acid, but is alkalinized by the addition of 0.9 cc. of normal sodium hydroxide per decigram. The resulting disodium salt is diluted with physiological sodium chloride solution so that 0.1 gm. is contained in 10 cc., which is well borne on injection intravenously. Of the four cases in one "a cure" was obtained, two showed progressive improvement until transferred, and in the fourth decided improvement and arrest of the disease were noted. He therefore thinks the preparation is superior to chaulmoogra ethyl esters.

L. R.

EUBANAS (Froilan). **Cocaine-Adrenalin in Leprous Neuritis.**—*Monthly Bull. Philippine Health Serv.* 1931. July. Vol. 11. No. 7. pp. 359–363. [6 refs.]

Neuritic pains are often very troublesome in leprosy and the author reports on injections into or around the thickened ulnar and other nerves of 1.0 to 1.5 cc. of a solution containing $\frac{1}{2}$ –1 per cent. cocaine and 5 per cent. adrenalin. Relief from pain is usually obtained in three to five days with an average of two injections, and no recurrence took place within six months.

L. R.

RABELLO, JR. & PORTUGAL (H.). Sur la présence du bacille de Hansen dans les lésions d'érythème polymorphe, chez un lépreux. [*Mycobacterium leprae* in the Erythema of Leprosy.]—*C.R. Soc. Biol.* 1931. Dec. 18. Vol. 108. No. 37. pp. 1088–1089.

The authors have made microscopical examinations of the early erythematous lesions of the skin in leprosy and found congestion and oedema with lymphoid infiltration, together with a few acid-fast bacilli in the deepest layers and sometimes in the blood vessels.

L. R.

GOMES (J. M.). Estudos sobre a lepra—Estase bacilar. [**Studies in Leprosy. Bacilli in Peripheral Circulation.**]—*Brasil-Medico.* 1931. Nov. 14. Vol. 45. No. 46. pp. 1061–1065. [9 refs.] English summary. [Hyg. Inst., S. Paulo.]

The author has found that acid-fast bacilli can frequently be found in the apparently healthy skin of the finger tips, fore-arm and back shortly after an attack of the febrile septicaemic stage of leprosy, indicating the dispersal of the organisms through the blood stream.

L. R.

RODRIGUEZ (Jose) & PLANTILLA (Fidel C.). **The Histamine Test as an Aid in the Diagnosis of Early Leprosy.**—*Monthly Bull. Philippine Health Serv.* 1931. May. Vol. 11. No. 5. pp. 236–240. [7 refs.]

This test is performed by placing a drop of 1 in 1,000 histamine phosphate on the healthy skin, and another on the affected skin, and pricking through the drops without causing bleeding. In skin with the nerves affected no change takes place, but in the healthy skin a sharply defined circle 3 to 4 millimetres in diameter around the prick becomes red in 20 seconds, followed by a flush or flare in the surrounding skin in another 15 to 30 seconds, and a wheal in 3 to 5 minutes. The absence of any reaction is fairly constant in bacteriologically negative leprotic nodules.

L. R.

OTA (M.) & SATO (S.). Reproduction de la lèpre chez les animaux par l'inoculation de cultures du *Mycobacterium leprae*. [**Leprosy transmitted Experimentally by Cultures of *Mycobacterium leprae*.**]—*C.R. Soc. Biol.* 1932. Jan. 15. Vol. 109. No. 1. pp. 29–32. With 2 text figs. [1 ref.] [Dermat. Clinic, Tohoku Imperial Univ., Sendai, Japan.]

These workers have now obtained cultures of 10 strains of *Mycobacterium leprae* by haemoculture from 65 lepers and they infected a white rat. They now report successful inoculation with a recently isolated orange coloured strain of two white rats with the production of evident skin lesions. Five guineapigs and four rabbits were also inoculated, and the organism was found subsequently in the internal organs without the production of evident naked eye lesions. They conclude that their cultures are the true Hansen's bacillus.

L. R.

TISSEUIL (J.). Contribution à l'étude de l'allergie et de l'anergie dans la lèpre. [**Allergy in Leprosy.**]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 766-769. [Gaston Bourret Inst., Nouméa.]

A rather thin emulsion of a leproma was sterilized by heating to 60° C. twice for one hour, and injected into both dermal leprous lesions and the healthy skin. In advanced cases little or no reaction occurred, but in early cases, with limited skin lesions, injections into the affected tissues produced a reaction within 48 hours with infiltration, redness and ecchymosis, slowly retrogressing after eight days, and in the healthy tissues a reaction commenced after a fortnight. The reactions are not of definite prognostic value.

L. R.

MORALES-OTERO (P.). **II. The Wassermann Reaction in Leprosy.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Sept. Vol. 7. No. 1. pp. 69-77. [16 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

The author has previously recorded that in 33,000 Wassermann tests in Porto Rico only 14.54 per cent. showed even weak reactions, but in lepers the proportion of positive reactions was 65 per cent. Further work on the cerebrospinal fluid of lepers showed that it was normal and free from acid-fast bacilli. Post-mortems showed that only one of eleven lepers giving a positive Wassermann during life showed visceral syphilis; this is contrary to what is found in syphilitic infections. Moreover, in lepers the reactions appear and disappear in a short time in the absence of antisyphilitic treatment, positive reactions tending to occur during febrile exacerbations in lepers, and anti-syphilitic treatment is often harmful in them. He concludes that positive reactions in lepers do not indicate the presence of syphilis.

L. R.

ADANT (M.). La cuti-réaction à la tuberculine chez les lépreux. [**The Tuberculin Skin Reaction in Leprosy.**]—*C.R. Soc. Biol.* 1931. Oct. 23. Vol. 108. No. 29. pp. 447-448. [2 refs.] [Bact. Lab., Elisabethville, Belgian Congo.]

There is a difference of opinion regarding the interpretation of tuberculin reactions in lepers as to whether they are due to leprosy alone or only to tubercular complications in that disease. The author has carried out tests with lepers, and with apparently healthy contacts, in Tropical Africa; in 17 lepers he obtained 8 negative and 9 positive reactions, and in 11 healthy contacts 5 were positive and 6 negative, so his results are inconclusive.

L. R.

GOHAR (M. A.). **Study of the Antibody Contents of the Serum of Lepers.**—*Zent. f. Bakt.* I. Abt. Orig. 1931. Oct. 20. Vol. 122. No. 6/7. p. 516. [4 refs.] [Bact. Dept., Faculty of Med., Cairo.]

Sterile acid-fast-containing fluid extracts of nodules were employed as the antigen, but the blood serum of lepers showed no trace of complement fixing immune bodies or agglutinins against the leprosy bacillus.

L. R.

LE GUYON (R.). Sur l'étiologie de la lèpre des rats. Allaitement croisé par des mères saines de jeunes rats issus de mères lépreuses et inversement. [**The Aetiology of Rat Leprosy. Experiments in Cross-Suckling.**]—*C.R. Soc. Biol.* 1931. Nov. 27. Vol. 108. No. 34. pp. 792-794. [2 refs.]

The author noticed that the young of female rats with rat leprosy all died in 3 to 5 weeks after their birth, so he has tested the effect of allowing the young of leprosy rats to be suckled by healthy females and vice versa. The result was that the rats born of healthy mothers when brought up by leprosy females all died before the end of the fifth week and vice versa, so clearly hereditary infection played no part in causing the mortality.

L. R.

BOYÉ. Sur une maladie de la sarigue de Guyane présentant de grandes analogies avec la lèpre humaine. [**A Disease resembling Human Leprosy in the Opossum.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 637-639.

The author describes leprosy-like lesions in the opossum, *Philander cancrivorus*, affecting the skin of a leg. At a post-mortem examination he found acid-fast bacilli in the inguinal glands, but not in the internal organs. He considers it premature to conclude that the disease is leprotic.

L. R.

COCHRANE (R. G.). **Leprosy, its Prevention and Control.**—*Jl. State Med.* 1931. Oct. Vol. 39. No. 10. pp. 583-593. [19 refs.]

In this paper, mainly a summary of recent work, the author advises surveys with treatment of early cases, examination of contacts, school children and immigrants, training medical men and dressers, and propaganda.

L. R.

MARIANI (Mario). Otto casi di lebbra familiare a Suzzara. [**Eight Cases of Familial Leprosy in Suzzara (Mantua).**]—*Arch. Ital. Sci. Med. Colon.* 1931. Nov. Vol. 12. No. 11. pp. 654-685. With 9 text figs. [50 refs.] English summary (5 lines). [Municipal Hyg. Office, Suzzara.]

Details of eight cases of leprosy are given, their clinical condition and the results of laboratory examinations. Two of the patients belonged to one family, six to another.

H. H. S.

JAPANESE JOURNAL OF EXPERIMENTAL MEDICINE. 1931. Oct. 20. Vol. 9. No. 5. pp. 403-507. **Leprosy Number.**

This is another volume of over 100 pages of references, with very brief summaries in some cases, to 509 papers on leprosy; it will be of great value to earnest students of the subject.

L. R.

FREISE (Fred. W.). **Brazilian Drugs used in Leprosy.**—*Prescriber*. 1931. Nov. Vol. 25. No. 11. pp. 369-373. [1 ref.]

The botanical names, and contents, as far as is known, of 14 drugs which have been used in leprosy in Brazil, chiefly for local application, are given.

L. R.

FERRIER (P.). Traitement physiologique de la lèpre. [**Physiological Treatment of Leprosy.**]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 852-860.

The author claims to have obtained good results in a few cases of leprosy by allowing sufficient time between meals, the avoidance of acids, including vegetable ones, and giving abundance of albuminous, but limited amounts of carbohydrates and fats.

L. R.

ROGER (Henri). Lèpre à forme syringomyélique.—*Marseille-Méd.* 1931. Aug. 25. Vol. 68. No. 24. pp. 225-231.

TISSEUIL (J.). Contribution à l'étude des léproïdes. Léproïdes en airc.—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 763-765.

VEERASINGHAM (K. V.). Early Manifestations of Leprosy.—*Malayan Med. Jl.* 1931. Dec. Vol. 6. No. 4. pp. 104-107. [8 refs.]

VIGNE (Paul) & PÉDAT. Un cas de maladie de Hansen.—*Marseille Méd.* 1931. June 25. Vol. 68. No. 18. pp. 809-812. With 1 text fig.

TROPICAL DERMATOLOGY.

PEZZI (Giuseppe). Contributo allo studio del "Piede di Hong-Kong." ["**Hongkong Foot.**"]—*Ann. di Med. Nav. e Colon.* 1931. Nov.–Dec. 37th Year. Vol. 2. Nos. 5/6. pp. 713–722. With 2 plates. [11 refs.] [Catholic Mission Hosp., Hankow.]

Hongkong foot is the local name given to a condition of interdigital eczema which occurs in many, perhaps most, tropical countries. It is intensely irritating and owing to being rubbed or scratched often becomes acutely inflamed and complicated by the presence of staphylococcus and streptococcus. The author had 25 cases under his care, 9 Italians and 16 Chinese. The basal cause is an epidermophyton; in two of the former and five of the latter he isolated *E. rubrum* and in the remainder *E. inguinale*. Four of the patients had lesions elsewhere, two in the inguinal fold, one on the right hand between the middle and ring fingers and one periumbilical; from all these *E. inguinale* was grown. Treatment varies: some find ichthyol very useful; others prefer iodine preparations or salicylic acid.

II. II. S.

MATRAS (August). Ueber Ekzema mycoticum an Händen und Füßen und seine Pathogenese. [**Mycotic Eczema of the Hands and Feet, and its Pathogenesis.**]—*Arch. f. Dermat. u. Syph.* 1931. Mar. 30. Vol. 163. No. 1. pp. 47–57. [14 refs.] [Dermat. & Syph. Clinic, Univ., Vienna.]

A study of 100 cases seen in Vienna. In 93 the feet were affected, but microscopical findings were positive in 74 only; cultures were obtained from 58 and the trichophytin reaction was positive in 66. Among 74 of these cases there was "dyshidrosis" of the hands and the corresponding figures were only 12, 5 and 5. The question is therefore still obscure as local infection of the hands by fungus is rare. Nor can the hand lesions be reasonably ascribed to an allergic condition as the positive reactions to trichophytin are so few. In the opinion of the author, Dyshidrosis lamellosa sicca is however, always due to a local mycotic infection.

M. Sydney Thomson.

BEINTEMA (K.). Schimmelziekten van handen en voeten. [**Mycotic Diseases of Hands and Feet.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. Aug. 22. 75th Year. No. 34. pp. 4302–4314. With 11 figs. (9 on 1 plate). [Dermat. Lab., Imperial Univ., Groningen, Dutch Guiana.]

Mycosis of fingers and toes is common in the U.S.A. and according to HAZEN a large proportion of the well-to-do classes in the Southern States is infected with *Epidermophyton interdigitale* (Priestley). In Philadelphia of 100 students examined 49 showed mycoses of the feet. In Holland several cases amongst swimmers, have been seen recently by the author. The infection was apparently contracted in swimming baths where the fungi found a favourable medium in the wooden floor of the establishment. Cases were mainly seen during the summer when the growth of the epidermophyton was promoted by warmth. Covered and artificially heated swimming baths may become a permanent source of infection and it would be advisable to take measures to prevent

the use of floor mats, nail brushes and of laundry which cannot be sterilized. The author gives a detailed account of the clinical and bacteriological aspects of different types of mycotic diseases of hands and feet, and draws attention to the fact that microscopical examination of scabs from fingers is very often negative. Some writers ascribe the affection of the hands to an allergic reaction due to a mycotic infection elsewhere and they advise in these cases examination of the toes. The author is inclined to explain the absence of fungi in scabs from fingers as due to frequent washing of hands. The fact that in experiments inoculation with epidermophyton produces the same clinical picture shows in his opinion that these fungi are the primary cause of the disease and that they are not saprophytes growing on a dyshidrotic skin. The author summarizes the usual therapeutic measures and pays special attention to the treatment of mycotic infections of nails. He gives a warning not to stop the treatment too early, since recrudescence is very common in these cases.

H. Lwow.

RUGE (Heinrich). Zur Behandlung der Zwischenzehenekzeme in den Tropen und des sogenannten "Roten Hundes." [**The Treatment of Interdigital Eczema of the Feet in the Tropics and of "Prickly Heat."**]*—Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Jan. Vol. 36. No. 1. pp. 33-35.

The first section deals with the wet eruptions consequent on epidermophytosis. During the wet stage alcoholic lotions are recommended; these may contain 1 per cent. of silver nitrate, $\frac{1}{2}$ to 2 per cent. of resorcin or copper nitrate, 1 in 5,000 to 1 in 500. Later, the more usual decorticants etc., are recommended. Great stress is laid on the fact that the feet must be kept out of water.

For mild cases of "prickly heat" rice powder containing a little Desitin is used. For more severe cases in which exudation has occurred, recourse is had to the above lotions. The author restricts the use of autohaemotherapy to the very severe cases.

M. S. T.

ACTON (Hugh W.) & McGUIRE (C.). **Actinomycotic Lesions of the Skin of the Hands and Feet, due to *Actinomyces keratolytica*, n. sp.***—Indian Med. Gaz.* 1931. Feb. Vol. 66. No. 2. pp. 65-70. With 14 figs. (5 coloured) on 3 plates. [10 refs.]

A detailed and well-illustrated article describing work done in Bengal. There are five types of lesion, all being seen among field workers when their feet are sodden during the monsoon months. These may be briefly described as onychomycosis, paronychia, eczematous lesions of the feet, keratolysis plantare sulcatum [this *Bulletin*, Vol. 27, p. 523], and a deep interdigital fissuring, which cleft is surrounded by thick, white and macerated epithelium (mango toe); occasionally this last lesion ulcerates deeply, the *ulcus interdigitale* of Castellani. The organism has been demonstrated microscopically by McGuire's toluidine blue stain and has also been cultivated successfully on Norris' medium in every one of the forty-two cases quoted. It has also been found in horse and cow-dung. There is a very full description

of the fungus which has been provisionally named *Actinomyces keratolytica* (n. sp.). The lesions are easily cured by glycerine-formaldehyde (3ī to 5ī) or by 5 per cent. gentian violet lotion, the dressings being carried out twice daily for three weeks.

M. S. T.

BERON (B.). Zwei autochthone Fälle von Mycetoma mit schwarzen Körnern. [**Two Cases of Mycetoma with Black Grains.**].—*Dermat. Woch.* 1931. Feb. 21. Vol. 92. No. 8. pp. 265–272. With 15 text figs.

The patients were two brothers, aged twelve and seven years, who have never left the neighbourhood of their native village near Sofia. In both, one foot was affected by painless, nodular tumours. The inguinal glands were swollen and showed fistulae. There were also a few subcutaneous nodes scattered over their bodies. Bony absorption was demonstrated in the foot of one boy. It is noteworthy that both patients and one sister, all suffered from Keratoma maculosa disseminata symmetrica palmaris et plantaris. Black granules were obvious clinically and the presence of a fungus was amply demonstrated by the microscope. An addendum describes a third mild case in a young man from the same district of Bulgaria. The illustrations are good, and also illustrate the keratolysis on the feet unaffected by the growths.

M. S. T.

GRANTHAM-HILL (C.). **Some Clinical Observations on Mycetoma.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 39–48. With 12 figs. on 4 plates. [9 refs.]

Observations based on cases seen in Khartoum, 118 being of the black grain (maduromycotic) variety and 66 of the yellow grain (actinomycotic) type. Native opinion favours a thorn prick as the probable causative factor and in over 30 per cent. of these cases of less than six months duration, thorns were actually found embedded in the growth. The vast majority of the lesions occur on exposed parts and none were seen in people who wore boots. The actual plant has not been incriminated, but the *Acacia* family is under suspicion. Whilst the actual incubation period is unknown, one well-authenticated case showed nodules two months after a fall into a "thorn-bush." Intercurrent debilitating disease seems to play a large part in the rate of growth of mycetoma, whilst dissemination apparently occurs by direct spread through the tissues and not by the lymphatics in the majority of cases. The yellow variety would seem to be the more dangerous, having a much higher amputation and relapse rate. It spreads rapidly in bone where it frequently causes periostitis, necrosis, rarefying osteitis or occasional new bone formation which radiologically closely resembles a periosteal sarcoma. All chemotherapy is slow and as it is difficult to keep natives under treatment, surgical methods are recommended. Full details of technique are given, including the guiding naked-eye appearance of the tissues seen during operation.

M. S. T.

FROES (Heitor P.). **Mycetoma Pedis (Madura Foot) and its Incidence in Brazil.**—*Jl. Trop. Med. & Hyg.* 1931. Nov. 16. Vol. 34. No. 22. pp. 376–378. With 9 figs. on 2 plates. [5 refs.]

In all, only some 60 cases have been observed in Brazil. They were all typical and fell naturally into the groups of *Phaneromycetomas* (with nodules and sinuses) and *Cryptomycetomas* (without sinuses, but having a cystic appearance). The majority of the cases were *Actinomycotic*, of which six species have been found, *Nocardia bovis* being the most common. Five species of the *Maduromycoses* have also been seen. The author describes three cases very briefly and claims to have isolated a new fungus from one of them, to which he has given the name, "*N. genesii*." Its grains are smaller than are those of *N. pelletieri* and *N. africana*, measuring only 150–300 μ . They are red, very hard and extraordinarily numerous. The fungus is difficult to grow, and is slow in development, but it can be cultivated on potato and on Sabouraud's gelose. [See also this *Bulletin*, Vol. 28, p. 694–5].

M. S. T.

BUCHANAN (J. C. R.). **Injections of Iodine as an Adjuvant to Surgery in the Treatment of White Mycetoma.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Aug. 8. Vol. 25. No. 2. pp. 111–114.

This treatment has been used in British Somaliland when complete surgical excision would result in deformity, etc. As much growth as possible is excised and then tincture of iodine is injected into any suspicious areas remaining. The raw surfaces heal well under mild antiseptic dressings, but the doubtful nodules are injected with 1 to 2 cc. of the iodine every ten days for about two months. The treatment causes no general reaction and only transitory local pain. Three cases are quoted in detail.

M. S. T.

GOLDBERG (Mottis) & PIJPER (Adrianus). **Sporotrichosis in a White Man.**—*Jl. Med. Assoc. South Africa.* 1931. Mar. 14. Vol. 5. No. 5. p. 140. [2 refs.]

The case of a German aged 42 years, who had been resident in various parts of South Africa for the previous seven years. Three months after his arrival in Bechuanaland a small red and fluctuating swelling appeared in front of the left ear. After evacuation the wound never healed and similar nodules arose under the chin, on the trunk etc. Deep cold abscesses developed, one over the right scapula attaining the size of a cocoanut. Although the patient was heavily infected and sallow, there was no fever. Pus from the abscesses grew typical colonies of *Rhinocladium (Sporotrichum) beurmanni*. After aspiration of the abscesses, the patient got rapidly well on potassium iodide in small to moderate doses.

M. S. T.

MORALES (R.). **Un cas de lymphangite sporotrichosique au Guatemala. [A Case of Sporotrichosis with Lymphangitis in Guatemala.]**—*Ann. Parasit. Humaine et Comparée.* 1931. July 1. Vol. 9. No. 4. pp. 366–367. With 3 text figs. [General Hosp., Guatemala.]

Typical ulceration of the left wrist occurring in a native boy aged 18 years. Pure cultures of *S. beurmanni* were obtained from pus aspirated

from the epitrochlear gland. Although the disease is well-known in Guatemala this is apparently the first case in which the causative fungus has been determined with certainty.

M. S. T.

NAUCK (E. G.). Histologische Untersuchung über Dermatitis verrucosa und Mossy-Foot. [**Histological Investigation of Dermatitis Verrucosa and Mossy-Foot.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. July. Vol. 35. No. 7. pp. 394–410. With 18 text figs. [48 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

An account of cases seen in Costa Rica and in Africa, the causative organisms being *Phialophora verrucosa* Thaxter and *Acrotheca pedrosoi* Brumpt in dermatitis verrucosa, whilst *Actinomyces* were found in mossy-foot. It is stressed that differential diagnosis on clinical grounds alone is often impossible, but “the presence of fungous elements in a histologically recognizable granulation tissue makes the diagnosis of dermatitis verrucosa certain.”

M. S. T.

ECCLES (C. E.) & DORING (R.). **Cases of Pyosis Mansonii.**—*Jl. Roy. Army Med. Corps.* 1932. Jan. Vol. 58. No. 1. pp. 47–49. With 3 text figs.

The report of five cases, occurring in the same barrack room in Multan. The rash appeared on the flexor aspects in crops, the vesicular, pustular and impetiginous stages being succeeded by a purplish discoloration of the skin after healing. Small Gram-positive diplococci were found in the smears, particularly during the first two stages. The best results were obtained by the use of unguentum hydrargyri ammoniati dil, the cases clearing up within seven days.

M. S. T.

AARS (Charles G.). **Keratoma Plantare Sulcatum (Castellani).**—*Arch. Dermat. & Syph.* 1931. Aug. Vol. 24. No. 2. pp. 271–279. With 8 text figs. [11 refs.]

An account of this disease as seen among the natives of Dutch Guiana. The soles of men only were affected and then only during the rainy season. The author could find no evidence of fungus or other infection. It is distinguished from yaws by the absence of horny plugs, by a negative serum reaction, and by the lack of influence on it of antisyphilitic treatment. This differential diagnosis is further amplified by excellent illustrations of the two conditions.

M. S. T.

ROSNER (Simon). Sobre el tratamiento de los queloides. Resultados obtenidos en el Instituto de Medicina Experimental para el estudio y tratamiento del cáncer. [**The Treatment of Keloid in the Institute of Experimental Medicine, Buenos Aires.**]—*Bol. Inst. Med. Experim.* 1930. Dec. Vol. 7. No. 25. pp. 1375–1381. [16 refs.] French summary.

The author briefly reviews the numerous forms of treatment which have from time to time been employed in dealing with keloid growths

and gives details of 31 patients on whom he tried ray therapy. In his final report he omits all who failed to complete the course and he has been unable to trace 3 of the 31 whose details are given in the letterpress. Of the remaining 28, 18 are stated to have been cured, four showed marked improvement, four were slightly improved, and in two only was the treatment ineffectual. He regards this, consequently, as the method of choice. In some the lesions were extensive, involving in one patient the hand and forearm, the result of a burn, and several of those cured had had the lesion for as long as 5 years and one, who improved, for 10 years. The following is the standard laid down: 90 kilowatt, 2 milliamperes, a 2 mm. aluminium filter, applied at a distance of 23 cm. from the lesion, a dose of 4-8 H, and a course of 4 to 6 applications at monthly intervals.

H. H. S.

LEFROU (G.). Contribution à l'étude du Larbish. [**Contribution to the Study of Larbish.**]—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 157-163. [6 refs.]

Larbish is the native name in Senegal for a dermatitis linearis. A similar affection is seen in Sierra Leone, Ivory Coast, Liberia, Gabon and the Cameroons. The "line" is a subepidermal burrow with surrounding inflammation and of an average diameter of 1.5 mm. This is filled with clear serum and spreads irregularly and capriciously, sometimes remaining stationary and sometimes advancing several cm. a day. The chief symptom is a burning sensation, worse at night, and more severe in white patients. All efforts to find a worm or larva have failed, but the blood shews a marked eosinophilia which drops after cure. Histologically the most striking change is a sclerosis of the local vessels. The disease is common only in the rainy season, and affects the feet and legs, but Europeans usually shew lesions on the hands as well. The local treatment consists of a poultice or decoction made from the leaves of *Hibiscus* [*? Hibiscus*] *Sabdariffa*. The method is extremely efficient, but the active principle is unknown.

M. S. T.

CIUREA (I.) & STEPHANESCOU (Théodore). *Argas persicus* comme parasite de l'habitation humaine. [*Argas persicus* **infesting a House.**]—Reprinted from *Bull. Soc. Roumaine Dermat. et Syph.* 1929. Mar.-May. No. 2. 4 pp. With 2 text figs.

Three members of one family were bitten every night by an "insect." The reactions of each individual to the bite varied greatly; in one, only small wheals were produced and in another, swellings the size of a hen's egg resulted. But all complained of intense irritation lasting for about eight days in spite of the fact that the urticaria lasted only twenty-four hours. The family lived in an upper flat in a new concrete building and there was no history of contact with pigeons or chickens, the usual hosts of these ticks. Investigation of the flat resulted in their being found only in the bed-rooms. Although three were picked off the ceiling, the exact location of their "nests" could not be found, and all efforts to disinfect the rooms proved useless.

M. S. T.

AUGAGNEUR. Dermite érythémato-bulleuse d'origine quinique. [**An Erythemato-Bullous Eruption due to Quinine.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. July-Aug.-Sept. Vol. 29. No. 3. pp. 575-577.

A male coolie, aged 23, was given one gram of quinine sulphate *per diem* during an attack of malaria. The dose was divided into four parts and administered by the mouth. Three days later diarrhoea, nausea and abdominal pain accompanied the appearance of a generalized eruption. The lesions consisted of bullae, varying in size from that of a pea to that of a small nut, on a bluish erythematous base and were most closely aggregated on the trunk. The quinine was stopped and arsaminol substituted. After the patient had recovered, quinine was again administered and the same symptoms reappeared within twenty-four hours.

M. S. T.

ANDERSON (Nelson Paul) & AYRES (Samuel), Jr. **Dermatitis Venenata due to Wigandia Caracasana, a hitherto Unrecognized Cause. Report of Case.**—*California & Western Med.* 1931. Apr. Vol. 34. No. 4. pp. 278-279. With 1 text fig. [4 refs.]

Wigandia caracasana is a tropical American plant which has been introduced to California; the leaves are figured. The case was that of a nurse who had an itchy, weeping eruption on the face and forearms. In watering one of these plants daily she brushed against the foliage. Its poisonous property was known to the Japanese gardener. The patient submitted to a test with the leaf and stem, which produced next day an erythematous papular itching eruption. Five similar tests on normal persons were negative.

A. G. B.

ESLER (A. R.). Pemphigus.—*Kenya & East African Med. Jl.* 1931. Feb. Vol. 7. No. 11. pp. 333-336. [1 ref.]

MAZZA (Salvador) & CANAL FEIJÓO (E. J.). Micetoma de granos negros por *Madurella* Sp. del Chaco santiagueño.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 244-254. With 10 figs. [13 refs.]

MAZZA (Salvador) & PASQUINI LOPEZ (Carlos). Micetoma podal actinomicótico observado en Tucumán.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 255-260. With 6 figs. [4 refs.]

MAZZA (Salvador), QUINTANA (Hector) & DE LOS RIOS (Miguel). Sobre un paramicetoma observado en Jujuy.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 261-268. With 8 text figs. [3 refs.]

NIÑO (Flavio L.). Blastomicosis humana generalizada por *Criptococo* (n. sp.).—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 117-167. With 60 figs. & 3 coloured plates. [2 refs.]

NIÑO (Flavio L.), FERNANDEZ (Julián) & PALANT (Miguel). Nuevas observaciones de onixis y peri-onixis de origen blastomicótico.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 35-99. With 82 figs. & 3 plates. [4 refs.]

SLEEPING SICKNESS.

LEE (S. W. T.). **Report on Sleeping Sickness for the Year 1930.**—*Uganda Protectorate Ann. Med. & San. Rep. for Year ended 31st December, 1930.* Appendix IV. pp. 88–93. [Received 7th September, 1931.]

The number of cases of sleeping sickness diagnosed microscopically in Uganda during the year 1930 was 638; in addition to those there were 89 suspects. Deaths due to the disease numbered 51. The author states that the low mortality rate is remarkable; although the figures are not entirely accurate they suffice to indicate that very few people actually die of sleeping sickness in Uganda. He considers that the explanation is due to one or both of the following factors: firstly, the result of treatment and, secondly, that the trypanosomes are not of a virulent nature. The routine treatment of sleeping sickness by tryparsamide alone has now been abandoned and two doses of Bayer 205 are included in each course of treatment. Generally speaking, the results achieved have been excellent.

In the second portion of the report the author considers the present state of the disease in the various infected areas. This requires no special comment and the paper should be consulted in the original by those interested.

W. Yorke.

MCLEAN (N.). **A Sleeping Sickness Investigation in the Infected Areas of Kavirondo (1930–1931).**—*Kenya & East African Med. Jl.* 1931. Oct. Vol. 8. No. 7. pp. 180–199.

An account is given of previous investigations in the Kavirondo sleeping sickness areas, and the author then passes to a description of his own work. In the course of the investigation a total of 486 cases was discovered. The number of the population examined and the number of positives in the various regions are given in a table. The author states that in Kavirondo the disease is undoubtedly mild. Among 360 patients in all stages of the disease over 50 per cent. would admit of no illness at the time of examination. On close questioning complaints of headaches of various durations and intensities might be elicited. Somnolent cases were usually unmistakable and examination of the cerebrospinal fluid invariably clinched the diagnosis.

Whilst broadly speaking trypanosomiasis in the first stage is a haemic infection, in the second stage a glandular condition with trypanosomes scanty or absent from the peripheral blood, and in the third stage a central nervous involvement with hard scleroid glands in which trypanosomes can no longer be demonstrated, yet the division is not absolute. It was found that: (1) when trypanosomes were present in the glands they could invariably be demonstrated in the peripheral blood by examining thick films; and (2) in several cases in the third stage without glandular enlargement, but with a cerebrospinal count of over 1,000 per cmm., numerous trypanosomes were found in the peripheral blood. The author was unable to discover any evidence that persons suffering from trypanosomiasis ever recovered without treatment.

An investigation was made to ascertain whether an increased cell

count in the cerebrospinal fluid might be due to other diseases than trypanosomiasis, e.g., syphilis and yaws. The results of this investigation are given in a table which shows that the sigma titre of the cerebrospinal fluid is not increased in uncomplicated trypanosomiasis.

Treatment at the beginning of the investigation was rather of an experimental nature. The usual course for adults was three injections of Bayer 205, 1 gm., at weekly intervals, followed by three injections of tryparsamide, 2 gm., also at weekly intervals. Details of a considerable number of cases are given, from which it would appear that there is neither arrest nor a regression of the disease so far as the central nervous system is concerned after treatment with Bayer 205; and the clinical condition of the patients supports these findings. On the other hand, treatment with tryparsamide (10 to 16 gm. for an adult) invariably brought the cell count of the cerebrospinal fluid back to normal and the clinical improvement was dramatic. Several sleeping sickness lunatics, who had become a menace to the community, were known, after a course of tryparsamide, to settle down and lead useful and respectable lives. Details are given of a number of such cases.

Observations extending over 18 months on the treatment of 450 cases of trypanosomiasis have confirmed the views of numerous investigators that in tryparsamide we have a drug of unequalled therapeutic efficacy in *gambiense* infections. Only one case of blindness was observed. This was a man who had a cerebrospinal fluid count of 220 cells per cmm.; he had received three injections of Bayer 205, 1 gm. at weekly intervals, and subsequently three injections of tryparsamide, 4 gm., at four day intervals. The patient was seen six months later, unable to go about without assistance and almost completely blind.

The paper closes with certain recommendations for the future control of the disease.

W. Y.

SOREL & ROBINEAU. La trypanosomiase en Afrique Occidentale Française. [**Trypanosomiasis in French West Africa.**]*—Ann. de Méd. et de Pharm. Colon.* 1931. July-Aug.-Sept. Vol. 29. No. 3. pp. 532-561. With 5 maps. [5 refs.]

In two maps the authors contrast the distribution of sleeping sickness in the French West African Colonies as it now exists, with the state of affairs in 1920.

To-day, endemo-epidemic areas are found only in Dahomey, in Haute-Volta and on the Niger. In Dahomey they comprise the district of Djougou and part of Atacora; the extent of their distribution is not yet exactly determined. In Haute-Volta the districts of Ouagadougou, Dédougou, Bobo-Dioulasso, Gaoua and Kaya are seriously involved. On the Niger the only place where there is any tendency to epidemicity is at Torodi in the district of Say. In all other colonies, with the exception of Mauritania, where the disease has never been observed, trypanosomiasis only occurs sporadically. A detailed description is given of the present position of sleeping sickness in Dahomey, Haute-Volta and the Niger, together with an account of the measures which are being adopted to combat the disease. This must be consulted in the original by those interested.

W. Y.

MARTIN (G.). Commission de la maladie du sommeil [MESNIL (M.), President]: rapport général. [Report of (French) Sleeping Sickness Commission.]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 757-760.

A summary is given of the principles laid down by the previous Commissions of 1920 and 1924. The present Commission makes certain recommendations regarding the treatment of cases.

A. *In the centres.* In order to decide the best line of treatment not only should the lymph and blood be examined, but a lumbar puncture should also be made.

i. *Patients in the first stage without nervous lesion.* Give orsanine (Fournau 270) or atoxyl alone or with emetic. Arsenic resistance or a relapse is an indication for Bayer 205 (Fournau 309). Treatment should be prolonged for 6 to 12 weeks, and a lumbar puncture made a year after the end of treatment.

ii. *Patients in the meningeal stage.* Orsanine or tryparsamide should be used, the latter by preference if the changes in the spinal fluid are marked. If there is also a peripheral infection orsanine or atoxyl should be added to the tryparsamide. There is no hard and fast rule regarding the duration or total dosage to be given in this stage, or regarding the exclusive use of any particular medicament. The patient must be kept under medical control, frequent blood examinations made and repeated spinal punctures.

B. *In the bush.* The procedure should approximate as closely as possible to that of the hospitals and centres.

i. When lumbar puncture is possible.

(a) *Cerebrospinal fluid normal.* Orsanine 10 to 12 injections in gradually increasing doses of 2 cgm. to 2.5 cgm. per kilo. to a maximum of 2 gm. Or six injections of atoxyl (1 cgm. to 2 cgm. per kilo. with a maximum dose of 1 gm.) at intervals of at least a week.

(b) *Cerebrospinal fluid pathological.* Tryparsamide 12 injections at weekly intervals; the first injection not exceeding 1 gm., the second 2 gm. and the remainder 3 gm. These should be preceded by one or more sterilizing injections of small amounts of orsanine or atoxyl.

ii. When lumbar puncture has not been possible.

(a) *Patients recently infected.* Atoxyl 6 injections of 1.5 cgm. per kilo. with a maximum dose of 1 gm. This should be followed by 6 injections of tryparsamide.

(b) *Patients in which the infection is clinically obvious, and in whom parasites are not found in the blood.* One injection of atoxyl, then 12 injections of tryparsamide at weekly intervals.

(c) *Patients previously treated and still with trypanosomes in the blood.* Three injections of Fournau 309, or in case of contra-indication emetic. Then 12 injections of tryparsamide at weekly intervals.

There then follow certain recommendations of a general nature against infection, e.g. removal of villages, clearing, creation of segregation villages, improvement of diet, etc.

W. Y.

LEGER (M.). La classification classique de 1^{re} période sanguine et de 2^e période méningée, dans la trypanosomiase est-elle justifiée? [Are we justified in dividing Trypanosomiasis into First and Second Stages?]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. p. 833.

In sleeping sickness, as in syphilis, meningeal involvement sometimes occurs with extraordinary rapidity, in other cases it is greatly delayed, and in still others it never occurs. The author believes that instead of speaking

of first and second periods it is better to refer to lymphatic localizations, blood localizations, meningeal localizations, and cerebral localizations.

W. Y.

BOURGUEL (A.). La ponction lombaire en brousse, dans les secteurs de prophylaxie de la maladie du sommeil en A.E.F. [**Lumbar Puncture in the Bush in French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 826-828.

The author describes the technique of lumbar puncture as practised by him in the bush on 7,000 cases of sleeping sickness during a sojourn of two years in Moyen-Congo.

A guard is sent on 24 hours in advance and finds the inhabitants already assembled, as they have been warned by a runner. The guard then builds a suitable shelter properly orientated and protected from the wind; this is constructed of green wood, of grass, and of fresh leaves. The ground is watered and covered by banana leaves.

The method of sterilization of the instruments and skin is described. The author states that he has under these conditions made as many as 100 punctures in a day—a procedure which is rather fatiguing when it is remembered that the material has to be examined. He has never had an ill result. The native accepts the situation readily, and frequently believes that it is a method of treatment and not one of diagnosis.

W. Y.

BARRETT (R. E.). **On the Question of Immunity in Infants to Human Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 191-195. [3 refs.]

Between July, 1928, and August, 1930, over 2,000 cases of sleeping sickness were recorded in the West Nile District of Uganda. Amongst these cases there was not a single instance of an infantile infection. No young children below an age estimated to be about 3 were found to be infected with sleeping sickness. A review of some 900 cases in the East and West Madi sleeping sickness area recorded between 1919 and 1930 revealed precisely the same state of affairs, viz., the absence of sleeping sickness amongst infants. The author considers in some detail the explanation of this apparent fact and offers the suggestion that the malaria from which young children suffer to such a pronounced degree may be the explanation. His summary is as follows:

"It is tentatively suggested that a possible explanation of the absence of sleeping sickness amongst infantile populations of the West Nile and Madi Districts of Uganda and elsewhere may be the acute and recurring attacks of malaria sustained in infancy in endemic areas, and not ceasing until the development of malarial immunity between the third and fourth years of life. As this immunity develops so, it is suggested, does susceptibility to sleeping sickness increase."

[See, however, AITKEN, below.]

W. Y.

SAUNDERS (G. F. T.). **The Adhesion Phenomenon in Trypanosomiasis.**—*West African Med. Jl.* Lagos. 1931. Oct. Vol. 5. No. 2. pp. 28-31. [4 refs.]

The work of DAVIS and BROWN, and of JOHNSON and LESTER, having apparently shown the adhesion test to be of sufficient specificity

and accuracy to justify its use in the diagnosis of obscure cases of human trypanosomiasis, the authors decided to employ the test for this purpose at Yeji on the Volta River in the Gold Coast. The following summary is given :—

" 1. When virulent strains of trypanosomes are used 91 per cent. of proved cases of trypanosomiasis show some degree of adhesion, while 75 per cent. of cases not proved to be trypanosomiasis give completely negative reactions.

" 2. The false positives may be non-specific reaction, may be due to sub-infective inoculations, or to mild or relapsing infections.

" 3. Feeble relapsing strains of trypanosomes are not reliable for the test."

W. Y.

SICÉ (A.) & LEGER (Marcel). Note complémentaire sur le début de l'évolution nerveuse de la trypanosomiase humaine. [**Onset of Nervous Lesions in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 828-832. [8 refs.]

Reference is made to a previous paper by Sicé [this *Bulletin*, Vol. 27, p. 819] in which it was shown that the first manifestation of meningeal reaction may appear very quickly in the disease. The authors point out that although it is often impossible to determine in the African the period which elapses between the date of infection and the commencement of meningeal lesions, the same does not apply in the case of Europeans in whom careful interrogation will usually suffice to determine the date of the first symptoms.

In the present paper details are given of 6 cases of sleeping sickness, in all of which lumbar puncture before the end of the first year showed that the cerebrospinal fluid was no longer normal. In two of the cases the changes were marked at the 9th and 10th month respectively. Long before the appearance of the trypanosome in the sub-arachoid space, and most frequently before any clinical manifestation of nervous lesions, the meninges have lost their integrity and the nervous centres are attacked. The meningo-encephalitis evolves silently, and will only reveal itself clinically some months later. For some years human trypanosomiasis is especially a disease of the central nervous system; the invasion of the blood and lymphatic system is only a brief stage.

W. Y.

AITKEN (Isobel M. Malcolm). **A Clinical Note on Two Cases of Trypanosomiasis in Infants.**—*West African Med. Jl.* Lagos. 1931. July. Vol. 5. No. 1. pp. 13-14.

Details are given of two cases of trypanosomiasis in infants six weeks and two weeks old respectively. The author states what she considers to be the main points of interest in the following summary :—

" (1) The possibility of the occurrence of trypanosomiasis in very young infants, without clinical symptoms suggestive of the disease, and in districts very widely separated from each other.

" (2) The necessity for a routine examination of blood by the thick film method in all cases admitted to a children's hospital. In neither of the two cases recorded would trypanosomiasis have been diagnosable from the clinical symptoms.

" (3) The value of Bayer 205 in clearing up the blood of early cases in a very short time.

" (4) The absence of trypanosomes in the blood of either mother, thus probably ruling out a congenital origin, as was found in the cases described by Kellersberger (*Trop. Dis. Bull.*, Vol. xxiii, p. 51) and Mühlens (*Ibid.* Vol. xxvi, p. 702).

" (5) The similarity of 'origin' of Case (2) to that of Graf's case with a history of a 'boil.' (*Trop. Dis. Bull.*, Vol. xxvi, p. 703). Unfortunately in Case (2) the discharge from the boil was not examined for trypanosomes.

" (6) The apparent contradiction of Ficher's statement (*Trop. Dis. Bull.*, Vol. xxiii, p. 53) that the treatment of young children is unsatisfactory because of the difficulty of finding the correct doses of the medicinal substance used in treatment, since Case (1) had still remained free from symptoms of trypanosomiasis for six months after treatment."

W. Y.

McLEAN (N.). The Incubation Period of Sleeping Sickness illustrated by Two Cases of Trypanosomiasis among Europeans.—*Kenya & East African Med. Jl.* 1931. Nov. Vol. 8. No. 8. pp. 235–236.

Details are given of two Europeans who contracted sleeping sickness in January, 1929, while on safari in the Kuja River zone of South Kavirondo. The cases are of interest in that they throw some light on the incubation period of the disease. The following are the conclusions :—

" (a) The incubation period of trypanosomiasis is less than fourteen days. Circumstances in the above cases would strongly suggest that seven days is an accurate figure.

" (b) From the time of being bitten by an infected fly until the appearance of trypanosomes in the peripheral blood is probably about twenty-one days. In the case of Mr. X there is a possibility that novarsenobillon delayed the appearance of trypanosomes.

" (c) The local irritation around the bite of the infected tsetse supports Manson's original observation on this phenomenon."

W. Y.

MARTIN (K.) & MONIER (H. M.). Sur un cas de trypanosomiase humaine. [Case of Human Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 657–660.

A detailed account is given of a case of human trypanosomiasis which, in the authors' opinion, affords a good example of the dangers which attend the treatment of this disease by insufficient doses of tryparsamide.

The patient, aged 44, had lived for 20 years in Gabon; in June, 1930, trypanosomes were found in his blood. He was given 15 intravenous injections of tryparsamide in doses not exceeding 0.04 gm. per kilo.: the maximum dose injected was 2.4 gm. On November 3rd, trypanosomes were again found in the blood and between November 9th, 1930, and January 22nd, 1931, he was given 12 more injections of tryparsamide increasing in doses from 0.02 gm. to 0.055 gm. per kilo. From the eighth injection the dose was 3.263 gm. The patient then returned to France and was seen by the authors on February 18th, 1931. He exhibited characteristic glands, a quotidian fever not influenced by quinine, deep hyperaesthesia, headaches, insomnia, mental instability, loss of memory, and slow speech. Trypanosomes were present in the blood. Spinal puncture showed lymphocytes 6.4 per cmm., albumen 0.32 per cent. and chlorides 7.25 per cent.

On February 26th, the patient, who now weighed 64·9 kilo., was given 0·298 gm. of Fournau 270 [acetyl *p* amino-*o*-oxyphenyl-arsenic acid] and a week later, as this preliminary dose had been well tolerated, a maximum dose of 2·25 gm. Examination of the blood still showed trypanosomes. On March 13th a third injection of 2·25 gm. of Fournau 270 was given intravenously. Trypanosomes disappeared from the blood and the patient seemed to be much better. In all, 10 injections of Fournau 270 were given. Between March 26th and May 1st, 1930, several thick preparations of the blood were examined daily; in all 89 slides were examined and 12 were found to be positive.

As, notwithstanding the general improvement in the patient's condition, he was still infected, emetic was given. On September 7th, the condition was good, the weight 68·5 kilo., the fever had gone, and the speech was quicker. Spinal puncture showed 4·8 lymphocytes per cmm. and 0·29 per cent. of albumen.

The authors believe that, as the result of the first series of small doses of tryparsamide, the trypanosomes had become arsenic fast, so that the second series of larger doses, which reached as much as 3·6 gm. per injection, and the subsequent larger doses of Fournau 270 failed to sterilize the infection.

W. Y.

BLANCHARD (M.). Remarques sur la trypanosomiase d'un Européen. [**Case of Trypanosomiasis in a European.**—*Marseille Méd.* 1931. June 25. Vol. 68. No. 18. pp. 818-820.]

The patient—a European 55 years old—had spent 3 years in Chad in a region free from sleeping sickness. He had not had a single day's illness. On his journey home to France all went well until the boat reached the mouth of the Likouala when he was bitten on the left leg. There appeared a little ecchymosis which increased day by day until by June 8th, 1930, it had attained the size of a 5 franc piece: the lesion was painless. On June 9th he passed the routine medical examination to which all who wish to leave the Congo are subjected, and was declared free from trypanosomiasis. The following day, June 10th, he had a violent attack of fever and became very somnolent. A diagnosis of malaria was made and quinine given. The fever remained high, however, and the patient was prostrated and somnolent. He then complained of an enlarged inguinal gland on the left side. A blood film was examined and "very numerous trypanosomes" seen. Treatment was commenced with three injections of 270 Fournau, but as these were followed by marked oedema of the legs the drug was stopped and tryparsamide and emetic substituted. The three doses of 270 Fournau caused all the trypanosomiasis symptoms to disappear rapidly. The patient is now apparently cured.

The interesting points about the case are: The demonstration of the exact incubation period, viz., 10 days; the local lesion produced by the infective bite; the intensity of the blood infection; the marked somnolence; and the intolerance to 270 Fournau which, according to VAUCEL, is frequent amongst Europeans.

W. Y.

WALRAVENS. Influence de la trypanosomiase humaine sur la glycémie. Notes cliniques. [**Influence of Human Trypanosomiasis on Glycaemia. Clinical Notes.**—*Ann. Soc. Belge de Méd. Trop.* 1931. June 31. Vol. 11. No. 2. pp. 213-218. [Bact. Lab., Elisabethville.]

The author estimated the amount of blood sugar in 12 cases of sleeping sickness, before, during, and after treatment. In all, try-

panosomes were found before treatment by gland puncture, and in 6 of them also in the blood: all patients were apparently cured by the course of treatment. No definite variations were observed in the blood sugar titre before, during, and after treatment. In two of the patients the titre was very low before treatment, viz., 15 cgm. and 23 cgm. per titre respectively. One of these had a profoundly altered spinal fluid, but that of the other was practically normal. Treatment did not cause any marked alteration in the blood sugar titre, although the patients were cured of the disease. In the course of his work on human trypanosomiasis the author has encountered two cases of special interest.

The first patient when seen was in a critical state with trypanosomes in the glands and a profoundly altered spinal fluid containing very numerous lymphocytes (1050 per cmm.). On April 24th, 1924, a course of treatment was commenced consisting in all of Bayer 205 5 gm., atoxyl 10 gm., and emetic 1 gm. After this course of treatment on December 24th, the spinal fluid contained only 50 lymphocytes per cmm. In February, 1925, the number of lymphocytes had increased to 192. The patient was then given 5 injections, each of 3 gm. of tryparsamide. He disappeared but was seen again 5 years later when a lumbar puncture showed a normal spinal fluid.

The second case, a woman with positive glands and negative blood, was given 39 gm. of tryparsamide in 11 injections of which 7 consisted of 4 gm. doses. A month after the end of treatment the glands and blood were positive. A white rat was injected with the blood. The patient then received a course of Bayer and emetic and was cured. There was no relapse and the spinal fluid was negative. The white rat 15 days after inoculation showed trypanosomes in the blood. It was cured with tryparsamide. The author concludes from this that the trypanosome was not arsenic-resistant and the failure of tryparsamide to effect a cure in this case could not be explained on this hypothesis. [Before any weight could be attached to this contention more information is required. How much tryparsamide was necessary to cure the rat and how did this compare with the amount necessary to cure rats infected with other strains from man in the district in question?]

W. Y.

VAUCEL (M.) & BOISSEAU (R.). Résultats éloignés du traitement de la trypanosomiase humaine à forme méningée par la tryparsamide. [**Ultimate Results of Tryparsamide Treatment of Meningeal Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 528-530. [3 refs.] [Pasteur Inst., Brazzaville.]

In the following table the authors summarize the condition in 1931 of sleeping sickness patients treated with tryparsamide at Brazzaville in 1925-1926.

The conclusions are :—

1. Tryparsamide gives rise to definite cure in a large number of patients.
2. The results of tryparsamide are "all or nothing." The return of the cerebrospinal fluid to normal after a continued treatment amounting to at least 0.4 gm. per kilo. of body weight is generally definitive.
3. When a check is experienced—relapse or even simple amelioration—the prognosis is grave, and generally fatal.
4. When treated by tryparsamide, properly observed and controlled, human trypanosomiasis in the meningeal stage appears now to be an affection of the nervous system capable of easy and beneficial modification.

Patients treated in 1925-1926			Results obtained in 1931				
			Successes	Ameliorations.	Relapses (L C R)	Deaths	Disappearance
1st period ...	16 successes ...		13	—	—	—	3 (good condition)
2nd period at the beginning	30 successes ..		11	1	—	—	18 (good condition)
	1 doubtful ..		—	—	—	1	—
	2 checks ..		—	—	—	—	2 (bad condition)
2nd period later on	51 successes ..		29	2	1	1	18 (good condition)
	2 ameliorations ..		—	—	—	—	2
	9 relapses ..		3	—	—	4	2 (bad condition)
2nd period advanced	47 successes .		26	—	—	—	21 (good condition)
	10 ameliorations .		3	1	—	2	4
	22 relapses ..		2	—	—	15	5 (bad condition)
2nd period terminal	6 successes ..		5	—	—	—	1
	1 amelioration ..		—	—	—	—	1 (bad condition)
	2 checks ..		—	—	—	1	1 (bad condition)
Total .	199 patients		92	4	1	24	78
			121 patients				

W. Y.

MURAZ (M.). Le traitement standard de la maladie du sommeil. [Standard Treatment of Sleeping Sickness.]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 530-535.

In this short article the author summarizes the work which is now being undertaken in an attempt to combat sleeping sickness in French Equatorial Africa.

Three main measures have been recently adopted, viz, increase in the medical staff, formation of 23 centres for prophylaxis, and creation of 60 centres for treatment, where the patients are given a "standard-cure" consisting annually of 12 injections of "Fourneau 270" (orsanine), or of tryparsamide after diagnosis by lumbar puncture.

The activities of the staff are summarized in a table in which is shown the number of natives examined, the number of lumbar punctures made, the number of injections given, etc. The figures are enormous.

Two types of treatment are in operation, the first in the towns and the second in the bush. In the former the treatment is carefully controlled and new drugs are tested; in the second the standard treatment of 12 injections annually is given. The reasons in favour of such a

standard treatment are discussed in some detail. The question of expense is an important consideration. The standard treatment consists always of "270 Fourneau" for patients in the first stage of the disease, and of tryparsamide for those of the second stage; the latter treatment is always preceded by a sterilizing injection of atoxyl.

W. Y.

VAUCEL (M.) & SALAÜN (G.). Thérapeutique et prophylaxie de la trypanosomiase en A.E.F. (A propos du "traitement standard" de la maladie du sommeil.) [**Treatment and Prophylaxis of Trypanosomiasis in French Equatorial Africa.**—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 834-839. [Pasteur Inst., Brazzaville.]]

This paper is a criticism of the application of the standard method of treatment of sleeping sickness in French Equatorial Africa advocated by MURAZ and others. MURAZ differentiates between patients treated at Brazzaville and those treated in the bush. The authors point out that the difference is more apparent than real. The cases of unlimited treatment referred to by MURAZ are rare. It is true that at the Brazzaville centre some patients have remained for several years, but they are either incurables and abandoned by their families, or they are patients treated with new compounds kept under observation without further treatment. As a rule, the patients are not kept long at Brazzaville on actual treatment, and it is only the individuals in a bad state who remain more than a year. In the majority of cases 12 injections of tryparsamide suffice to restore the cerebrospinal fluid to a normal condition. The results of treating cases between January and October, 1931, are as follows:—

1. Patients in the second stage, 1st degree (hyperlymphocytosis):—
100 per cent. successes with 12 injections.
2. Patients in the second stage, 2nd degree (hyperlymphocytosis and hyperalbuminosis):—
47 per cent. successes with 12 injections,
85 per cent. successes with more than 12 injections,
15 per cent. of checks or ameliorations.

When a case is diagnosed early, the standard method gives excellent results, but if the meningeal lesions are more advanced failures are much more frequent. In such cases it is therefore dangerous to limit the course to the 12 injections prescribed in the standard treatment.

The authors discuss in detail the administrative difficulties of applying their method of treatment not only at Brazzaville, but in the other centres of treatment. The natives, it is true, rebel against existence at a treatment centre, and their detention there undoubtedly is a heavy charge on the sanitation budget. It is for this reason that the authors have encouraged the dispensary system, which works perfectly at Brazzaville. Many patients come up each week from places several hours distant, whilst others reside with friends in the neighbourhood. ~~the prognosis is grave, and generally~~

4. When treated by tryparsamide, properly considered by the authors human trypanosomiasis in the meningeal stage appears as a condition of the nervous system capable of easy and beneficial modification.

It combines the advantages of a prophylactic, in that it gives a minimum of blood relapses, with those of a curative, in that it is followed by a minimum of ultimate nervous evolutions.

Whilst there is no doubt that cases of sleeping sickness have been cured by two injections, or even by a single injection, of an arsenical, this does not justify the wholesale employment of such methods. Formerly, when in French Equatorial Africa the prophylactic course consisted of two injections of atoxyl the relapse rate was 29 per cent. annually. Now that the course consists of six injections, the blood relapses during the first year amount to only 6 to 10 per cent. ; to these must be added 25 per cent. in whom nervous lesions develop, notwithstanding the fact that lumbar puncture had shown them to be free from such lesions at the beginning of treatment. There remain, however, 70 per cent. of definite cures as the result of a course of six injections of atoxyl, and such, if one excludes Fournieu 270, still remains the best method of prophylactic treatment.

On the contrary, however, the examination of the cerebrospinal fluid, after the administrations of 12 injections of tryparsamide to patients in the second stage of the disease, shows that although this treatment is often efficacious and sufficient, nevertheless it must be prolonged in certain cases in order to protect the patient from later relapses. It is apparently in this respect particularly that the standard treatment fails.

W. Y.

SICÉ (A.). A propos de quelques échecs de l'action trypanocide des composés arsenicaux. [**Failures of Trypanocidal Action of Arsenicals.**]*—Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 660-663. [4 refs.]

The author comments on the fact that although in the great majority of cases of sleeping sickness certain organic arsenicals exert a most definite trypanocidal action, yet in a relatively few cases their use proves unsatisfactory. Details are given of four such cases, none of whom had had any previous treatment prior to their diagnosis and treatment at the Pasteur Institute at Brazzaville.

Case 1. Diagnosed December 27th, 1927. Blood positive ; cerebrospinal fluid cells 11, albumen 0.15 per cent. From December 27th, 1927, to March 21st, 1928, given a course of tryparsamide totalling 18.4 gm. On May 1st, 1928, there was a blood relapse. From May 1st to August 24th orsanine (22.7 gm.) was given. On September 28th there was a second relapse. From this date until January 25th, 1929, a second course of orsanine (26.3 gm.) was given. On May 31st there was another blood relapse. From May 31st until August 23rd, etharsanol (19.55 gm.) was administered. There was a fourth blood relapse on December 6th. The cerebrospinal fluid was unchanged. From December 1st, 1929, until February 14th, 1930, another course of orsanine was given. On April 11th, 1930, there was a fifth blood relapse. At this point arsenicals were abandoned and emetic tried, but as the patient disappeared the result is unknown.

Case 2. Diagnosed February 15th, 1927. Blood positive ; cerebrospinal fluid, cells 4, albumen 0.2 per cent. From February 17th to March 24th orsanine (11.9 gm.) was given. On April 4th there was a blood relapse. From April 9th to May 9th, weekly doses of atoxyl were given (4.8 gm.). On June 1st there was a second blood relapse. From June 8th

to July 27th weekly doses of emetic given (0.71 gm.). On September 14th there was a third relapse. From September 14th, to October 19th a course of moranyl was given orally; the total amount was 15 gm. there were no renal manifestations. On December 21st there was a fourth relapse. The patient was kept under observation until February 22nd, 1928, without treatment; blood examinations sometimes revealed the presence of trypanosomes and sometimes were negative; the condition of the spinal fluid was unchanged. From February 22nd until May 17th a course of tryparsamide (19.8 gm.) was given. He disappeared on November 2nd, a carrier of trypanosomes.

Case 3. Diagnosed August 2nd, 1927. Blood positive; cerebrospinal fluid cells 64, albumen 0.22 per cent. From August 2nd until December 21st, weekly treatment of orsanine given (14.7 gm.). On December 21st a spinal puncture showed cells 7, albumen 0.2 per cent. On July 18th, trypanosomes were again found in the blood, the cerebrospinal fluid was unchanged and the general condition was good. A second course of orsanine (19 gm.) was given from July 18th to October 21st. On March 4th, 1930, although the blood remained negative the spinal fluid was gravely changed, cells 251, albumen 0.5 per cent., trypanosomes present. Tryparsamide was then given and on June 20th the spinal fluid was greatly improved. Treatment continues and the prognosis is very guarded.

Case 4. Diagnosis July 9th, 1928. Blood positive; cerebrospinal fluid cells 6, albumen 0.2 per cent. From July 9th to October 10th orsanine (18.7 gm.) was given. On December 21st, trypanosomes reappeared in the blood and from this date until February 8th, 1929, weekly injections of atoxyl were given (8 gm.). Five months later, July 15th, the blood was positive, and spinal puncture gave evidence of commencing meningeal irritation. From July 15th, to October 21st etharsanol (15.9 gm.) was given. On February 3rd, 1930, trypanosomes were again found and the spinal fluid was normal. Between February 10th and March 21st the patient received 0.65 gm. of emetic and 4 gm. of atoxyl; he then disappeared.

W. Y.

DUBOIS (A.). A propos de l'action antimutative du Bayer 205. [**The Antimutative Action of Bayer 205.**—*Ann. Soc. Belge de Méd. Trop.* 1931. June 31. Vol. 11. No. 2. pp. 131–138. [5 refs.] [School of Trop. Med., Brussels.]

The author has re-examined the question whether a subcurative dose of "Bayer 205" will so change a trypanosomal infection in guineapigs as to make it curable by emetic or other antimonial preparation. In his first group of experiments a small dose of "Bayer 205" was administered to the guineapigs at the time of infection with *T. congolense*; when the blood showed parasites the antimonial was given. In the second group of experiments the infected guineapigs were treated with "Bayer 205," and subsequently when a relapse occurred with the antimonial. In neither group of experiments were cures obtained. It is consequently concluded that "Bayer 205" does not exert any antimutative action on *T. congolense*.

Further experiments, however, showed that "Bayer 205" exerted a definite antimutative action on the much more sensitive *T. pecaudi* in that guineapigs, which had relapsed with this infection after treatment with small doses of "Bayer 205" were cured by what were normally inefficacious doses of antimony.

W. Y.

LEVADITI (C.), BARDET (J.), TCHAKIRIAN (A.) & VAISMAN (A.). Propriétés thérapeutiques de l'indium dans les trypanosomiasés et la syphilis expérimentale. [**Indium in the Treatment of Trypanosomiasis and Spirochaetosis.**—*C.R. Acad. Sci.* 1932. Jan. 18. Vol. 194. No. 3. pp. 325-327. [1 ref.]

The authors have studied the preventive and curative action of tartrate of indium in trypanosomiasis, relapsing fever, spirillosis of fowls, and experimental syphilis of the rabbit. A solution of the drug, 0.0157 gm. per cc., was made and given subcutaneously. A mouse of 20 gm. tolerated a dose of 0.0015 gm. Indium is hence about 10 times as toxic as gallium. The results of the experiments showed that indium is about as active as gallium, and that it is to be placed among the elements therapeutically active in certain trypanosomiasés and in experimental syphilis. Its preventive and curative actions are satisfactory in mice infected with *T. evansi*, but they are inconstant in experimental syphilis of the rabbit.

W. Y.

VON JANCsó (N.). Photobiologische Studien in der Chemotherapie. I. Lichtempfindliche Trypanosomen in trypaflavinbehandelten Tieren. II. Photodynamisches und therapeutisches Interferenzphänomen bei der experimentellen Naganainfektion. [**I. Light-Sensitive Trypanosomes in Animals treated with Acriflavin. II. Photodynamic and Therapeutic Interference Phenomenon in Experimental Nagana Infection.**—*Zent. f. Bakt.* I. Abt. Orig. 1931. Oct. 1. Vol. 122. No. 4/5. pp. 388-392. With 1 text fig. [7 refs.]; 393-400. With 1 text fig. [10 refs.] [Reich Health Office, Berlin-Dahlem.]

I. Reference is made to the work of RAAB (1900), who showed that paramoecium would live in solutions of fluorescent substances, e.g., eosin, acridin, etc., in the dark, but died when exposed to light. Jancsó has now found that trypanosomes from animals treated with trypaflavine die rapidly when exposed to light.

The conclusions are as follows:—

1. The trypanosomes found in the body of nagana infected mice after treatment with trypaflavine were sensitive to light.

2. The light sensitivity was dependent on the fact that the parasites had taken up trypaflavine.

3. The sensitized trypanosomes were killed by those rays which are absorbed by trypaflavine. Passage through a trypaflavine filter renders the light inactive.

4. The photodynamic activity of trypaflavine is dependent on its fluorescence.

5. In view of the fact that the light-sensitive trypanosomes were also killed in a short time by dark background illumination, it was possible to work out a method to demonstrate the quantitative fixing of trypaflavine by the parasites.

6. The results show that trypanosomes in the blood of treated animals anchor trypaflavine.

II. The author has applied the methods and information discussed in his first paper to the problems of acriflavine resistance and the interference phenomena. Infected mice which had received a preliminary dose of 1/2000 solution of parafochsin were given 7 to 9 hours later a dose of trypaflavine. On contrasting these mice with those

treated with trypaflavine alone, it was found that the therapeutic action of trypaflavine was much weakened or suppressed, and that the trypanosomes were less photosensitive. It thus appears that in some way the preliminary injection of parafuchsin had altered the trypanosomes so that they exhibit less tendency to take up parafuchsin.

W. Y.

VON JANCsó (N.). Photobiologische Studien in der Chemotherapie. III. Therapeutische und photodynamische Festigung von Naganatrypanosomen durch systematische Behandlung mit Trypaflavin. [**Photobiological Studies in Chemotherapy. III. Therapeutic and Photodynamic Fastness of Nagana Trypanosomes through Systematic Treatment with Trypaflavin.**].—*Zent. f. Bakt.* I. Abt. Orig. 1931. Dec. 15. Vol. 123. No. 3/4. pp. 129–140. With 3 text figs. [9 refs.] [Reich Health Office, Berlin-Dahlem.]

A distinct difference is manifest in the sensitiveness to light after trypaflavin injection between normal and trypaflavin-fast trypanosomes. After 9 or 10 subcurative injections of trypaflavin the drug-fast strain which resulted was found to be 40 to 60 times as resistant to the action of light as was the original strain. This fact is in all probability to be explained on the ground that the resistant trypanosomes had taken up much smaller quantities of the drug than had the normal parasites.

Just as is the case in therapeutic interference, so also in that of the trypaflavin-resistant strain, a definite relationship could be made out between therapeutic influence and the behaviour of the blepharoplast on dark-field illumination. In the normal strain treated by trypaflavin all the individual trypanosomes exhibited a lighting up of the blepharoplast within a few minutes; the phenomenon was entirely absent in trypanosomes of a completely fast strain. In strains of moderate resistance the blepharoplasts were only illuminated by maximum doses of trypaflavin and only then in a certain proportion of the individual trypanosomes. [These observations confirm the conclusions reached by the reviewer and his colleagues concerning the nature of drug-resistance (this *Bulletin*, Vol. 28, p. 910).]

W. Y.

COLLIER (W. A.). Versuche ueber den Einfluss der Bestrahlung auf Trypanosomen und Bakterien. [**Influence of Radiation on Trypanosomes.**].—*Ztschr. f. Hyg. u. Infektionskr.* 1931. Sept. 15. Vol. 112. No. 4. pp. 724–731. With 2 text figs. [7 refs.] [Robert Koch Inst. for Infectious Diseases, Berlin.]

In the experiments described in this paper an Osram-Solarca Lamp was used which gives slight light and warmth and ultra violet rays qualitatively equivalent to sunlight. The exact technique employed must be consulted in the original by those interested. The action of the radiation on the pathogenicity of the trypanosomes is shown in a table. The incubation period was progressively increased as the exposure was increased from 5 to 20 seconds; when the exposure was longer than 20 seconds the trypanosomes were non-infective. After the exposure, the parasites were, however, as motile as previously, but subinoculation into mice did not produce infection.

Further experiments were undertaken to ascertain whether radiation

produced any changes in the antigen properties of the trypanosomes. These showed that in many cases this was actually the case and that the modifications thus produced remained unchanged over a period of three months.

W. Y.

YORKE (Warrington), MURGATROYD (Frederick) & HAWKING (Frank). **Studies in Chemotherapy. VI.—The Production of Resistant Strains by Exposure of Trypanosomes to Reduced Tryparsamide *in vitro*.**—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 521–544. [1 ref.]

In No. 5 of this series the authors showed that a normal strain of trypanosomes, *in vitro* in a nutrient medium, will rapidly absorb an organic trivalent arsenical in solution such as reduced tryparsamide, whereas a resistant strain of the same trypanosome is in these circumstances incapable of absorbing the drug [see this *Bulletin*, Vol. 28, p. 910].

This observation led them to enquire whether a single exposure *in vitro* of a normal strain of trypanosomes to a solution of reduced tryparsamide, or repeated exposures, each exposure alternating with the passage of the washed parasites through a normal mouse, would result in the production of a strain resistant to the drug. From the first series of experiments it became clear that a single exposure *in vitro* to any concentration of reduced tryparsamide does not enhance appreciably the resistance of the trypanosomes to the drug. A series of exposures alternating with passage through mice was then undertaken:—

“Two parallel series of experiments were conducted. In the first, the concentration of reduced tryparsamide was always 1:12,800,000, i.e., the highest concentration which failed to exert any harmful effect on the suspension of normal trypanosomes. In the second, the concentration of reduced tryparsamide was initially 1:800,000, but as the parasites developed resistance, this was correspondingly increased, so that the concentration of the drug was always maintained at the highest level which just failed to destroy all the parasites in the suspension.

“For the sake of simplicity we shall at first confine ourselves to a consideration of the second series of experiments . . .”

“The general technique employed in each experiment was the same as that already described. A heavy suspension of trypanosomes obtained from one of the mice from a previous experiment was exposed *in vitro* for 1 hour at 37° C. to a solution of reduced tryparsamide in nutrient medium. The trypanosomes were then deposited by means of high speed centrifugalization, and after being washed four times in nutrient medium were injected into a group of four mice. When these mice became infected, the trypanosomes from one of them were used for the next experiment, and the degree of resistance of the infections in the other mice was tested by the administration of various doses of reduced tryparsamide.”

The results are shown in twelve double tables, the data of which are analysed. The following is one of the conclusions drawn:—

“The speed with which resistance develops and the degree of its development depend on the concentration of the solution of reduced tryparsamide. When the concentration of reduced tryparsamide was the highest which could be employed without destroying any appreciable number of the trypanosomes (i.e., 1:12,800,000 in the conditions of the experiment, viz., time of exposure 1 hour at 37° C., number of trypanosomes 10,000 per 256 squares of the haemocytometer scale) no definite increase in resistance was observed until the eleventh exposure, and even after the thirty-sixth

exposure the resistance was increased only about twenty times. When, however, the concentration of reduced tryparsamide was the highest which could be employed without killing all the trypanosomes, i.e., 1 : 800,000 in the first four exposures and ever increasing concentrations in subsequent exposures, a considerable degree of resistance was observed after the fifth exposure, and, so far as could be judged from *in vivo* tests, complete resistance after the seventh exposure. Finally, a strain was produced which withstood a concentration of 1 : 6,250 reduced tryparsamide, and which more delicate tests shewed to be no less than 500 times as resistant as the original strain."

The summary is as follows :—

"1. A series of short exposures of a normal strain of *T. rhodesiense* to suitable solutions of reduced tryparsamide in nutrient medium—each exposure to the drug *in vitro* alternating with the passage of the washed parasites, through a normal mouse—sufficed to produce a strain highly resistant to the drug.

"2. An enhanced drug resistance was not immediately noticeable, but first made its appearance only after a number of exposures of the strain to the drug.

"3. The speed with which resistance developed, and the degree of its development, depended on the concentration of the solution of reduced tryparsamide to which the parasites were exposed.

"4. The optimum concentration of drug for this purpose was found to be the highest employed which failed to destroy all the trypanosomes in the suspension exposed to the drug. By this means a strain of trypanosomes was quickly produced which was at least 500 times as resistant to reduced tryparsamide as was the original strain; it was also found to be exceedingly resistant to halarsol and stibenyl, but only slightly so to arsenophenylglycine, and not at all to Bayer 205. The use of lower concentrations of drug likewise sufficed for the production of a resistant strain of trypanosomes, but the process was much slower and the degree of resistance resulting was much less.

"5. The question was considered whether the development of drug resistance by a strain of trypanosomes is the result of a process of *selection*, i.e., the weeding out of the more sensitive individuals, and survival of those naturally resistant which tend always to reproduce their like; or whether it is due to a process of *mutation*, i.e., a gradual change in all, or in certain, individuals resulting from the stimulus of frequent exposures of the strain to suitable concentrations of the drug, thus giving rise to the acquisition of a new character which is transmitted through innumerable subsequent generations.

"6. A critical analysis of the facts brought to light in these experiments indicates that the development of drug resistance by a trypanosome is fundamentally the result of a process of mutation, although the possibility cannot be excluded that under certain conditions the process of mutation may be aided by one of selection."

A. G. B.

BROWNING (C. H.), COHEN (J. B.), COOPER (K. E.) & GULBRANSEN (R.).
Therapeutic Interference caused by Isomerides of Trypanocidal Styryl Quinoline Derivatives.—*Proc. Roy. Soc. Ser. B.* 1931. Sept. 1. Vol. 109. No. B760. pp. 51–57. [5 refs.] [Med. School, Leeds; Path. Dept., Univ., & Western Infirmary, Glasgow.]

The following summary is given :—

"In the case of certain quarternary salts of styryl quinolines which possess active trypanocidal properties *in vivo*, e.g., 2 (*p*-amino styryl) 6 acetyl amino quinoline methosulphate, synthesis is effected by condensation in the presence of piperidine of the quarternary salt of the quinaldine

derivative with the aldehyde. The isomeride prepared by the addition of methyl sulphate subsequent to condensation of the aldehyde, using zinc chloride as the condensing agent, leads to a compound which is not a true quarternary salt but a loose molecular complex. The latter substance is much less effective as a trypanocidal agent; further, when administered along with the former, it produces therapeutic interference, on testing for trypanocidal action in mice infected with *T. brucei*. In the case of 2 (*p*-acetyl amino styryl) 6 amino quinoline methochloride, the second method leads to a mixture of the two isomerides which is deficient in trypanocidal action as compared with the quarternary salt prepared by the first method. Since the inactive isomeride may cause therapeutic interference when present in high dilutions along with the corresponding active compound, it appears in general that great care is therefore necessary in drawing conclusions as to the therapeutic efficacy of impure substances."

W. Y.

QUASTEL (Juda Hirsch). **Trypanocidal Action and Toxicity to Enzymes.**

—*Biochem. Jl.* 1931. Vol. 25. No. 4. pp. 1121–1127. [2 refs.]
[City Mental Hosp., Cardiff.]

The following is the summary :—

"1. Trypan-blue, trypan-red, and Bayer 205 are toxic to fumarase.

"2. The toxicity of six naphthylaminedisulphonic acids and their *s*-carbamide derivatives on fumarase has been investigated. It is shown that the free acids and their first *s*-carbamide derivatives are inert. Toxicity begins to be apparent with the second carbamide derivatives (*s*-carbamide of *m*-aminobenzoylnaphthylaminedisulphonic acid) and is very marked with third carbamide derivatives (*s*-carbamide of *m*-aminobenzoyl-*m*-aminobenzoylnaphthylaminedisulphonic acid). Attention is drawn to the parallelism which exists between this effect and trypanocidal action which begins only at the second *s*-carbamide stage of combination and is most marked at the third *s*-carbamide stage. The parallelism with the substantive properties of these derivatives to cotton is also discussed, and it is shown that there must be some structure in common between the fumarase enzyme, cotton fibre and the trypanosome which makes for specific combination or adsorption with the second and third *s*-carbamide derivatives of the naphthylaminedisulphonic acids. These derivatives are not toxic to urease.

"3. Derivatives of the 2-naphthylaminedisulphonic acids are much more toxic to fumarase than those of the 1-naphthylaminedisulphonic acids.

"4. Fumarate 'protects' the enzyme, fumarase, from the toxic action of these derivatives.

"5. The presence of proteins diminishes or eliminates the toxic action of these derivatives."

W. Y.

KAPUSSTO (M. L.). Zur Frage der Bedeutung der Immunkörper für den chemotherapeutischen Effekt. [**Significance of Immune Body for the Chemotherapeutic Effect.**]—*Zent. f. Bakt.* I. Abt. Orig. 1931. Oct. 1. Vol. 122. No. 4/5. pp. 380–388. [16 refs.]
[Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

EHRLICH reached the conclusion that besides the direct action of the chemotherapeutic agent on the parasite, antibodies played a significant part in determining the final result of treatment, and that sterilization of the infected organism was the result of a combined action of two factors: a direct action of the chemotherapeutic agent on the parasite,

and antibody which was formed by the host in response to the active antigen formed by the parasites destroyed by the drug.

After giving a summary of more recent work on this subject, the author passes to a consideration of his own work. He prepared a specific immune serum in the following manner. Rats at the height of infection with *T. equiperdum* were cured by a dose of salvarsan and 10 to 14 days later were bled to death: the blood of a number of animals was collected and the serum separated and deactivated at 56° C. for 30 minutes. A large number of mice were then infected with the same strain and treated as follows: The first group were treated with 0.4 to 1.0 cc. of immune serum alone; the second group with a non-sterilizing dose of salvarsan and 0.4 to 1.0 cc. of immune serum; and the third group with a non-sterilizing dose of salvarsan alone. The results of the experiments are set forth in a series of tables. No definite advantage was found from adding the immune serum to the drug, and the conclusion is reached that the action of antibodies in salvarsan therapy of trypanosome infections is only slight and inconstant.

W. Y.

HASSKÓ (A.). Experimentelle Untersuchungen über Misch- und Sekundärinfektion. II. Heilversuche bei mischinfizierten Tieren; zugleich ein Beitrag zur Funktion des retikuloendothelialen Systems bei den chemotherapeutischen Heilungsvorgängen. [**Experimental Investigation on Mixed and Secondary Infections. II. Curative Experiments on Animals with Mixed Infections; Function of the Reticulo-Endothelial System in Chemotherapeutic Curative Processes.**].—*Zent. f. Bakt.* I. Abt. Orig. 1931. Dec. 15. Vol. 123. No. 3/4. pp. 140–150. [14 refs.] [Reich Health Office, Berlin-Dahlem.]

Although mixed infections in men and animals are of frequent occurrence, the question whether the curative action of chemotherapeutic substances is influenced under such conditions has not yet been settled. The only author who has conducted experiments on this subject is apparently KAWAMURA [this *Bulletin*, Vol. 28, p. 734]. He found that when mice infected with spirochaetes and trypanosomes were cured of the former infection by solganol, the latter developed rapidly and fatally; whilst in doubly infected mice which remained untreated a long continued depression of the trypanosome infection was manifest.

The author decided to repeat and extend the work of KAWAMURA. He used white mice infected with various strains of relapsing fever spirochaetes and with *T. brucei*. The drugs employed were trypaflavin, germanin, emetic, salvarsan and a gold compound called "sulfoharnstoff." The experiments, which are recorded in detail, show that the trypanocidal action of the various chemotherapeutic substances is lessened in the mixed infections, in so far as doses which sterilized the mice infected only with trypanosomes produced merely a temporary disappearance of the trypanosomes in the mixed infections.

The author believes that the occurrence of relapses in the mice with mixed infections after the injection of normally sterilizing doses shows that the function of the reticulo-endothelium is damaged in the mixed infections. In support of this hypothesis he records an experiment in which 4 mice (2 healthy and 2 at the height of infection with

Sp. crociduræ) were injected with 1.5 mgm. of colossal gold. The mice were killed 30 mins. later and whilst the normal animals exhibited a heavy deposit of gold in the reticulo-endothelial cells of the liver and spleen, the spirochaete-infected animals showed mere traces. The spirochaetal infection exercises the same inhibitory action on the reticulo-endothelial cells as does electro-colloidal copper solution (v. JANCZO, 1929-1931).

In the mice with mixed infections there is a severe injury to the reticulo-endothelium, the immuno-biological functions of which are responsible for the permanent cure, whilst the direct trypanocidal action of the drug remains unchanged.

W. Y.

DUBOIS (A.). Expériences préliminaires sur l'action trypanocide de diverses substances antimoniales nouvelles. [**Preliminary Experiments on the Trypanocidal Action of New Antimonials.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 275-279. [1 ref.] [School of Trop. Med., Brussels.]

The research laboratories of the Union Chimique Belge sent to the author for trial certain antimony derivatives of quinoline; these are designated DN6, DN7, DN8, DN9 and DN10. All these products were tried on small laboratory animals infected with *T. pecaudi* and *T. congolense*. The results showed that they all had a definite trypanocidal action. DN9 was the least active. The preference should apparently go to DN8 and DN10.

W. Y.

HU (C. H.). **The Lymphatic Reaction in Experimental Trypanosomiasis.**—*Nat. Med. J. China.* 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 435-457. With 14 figs. (2 coloured) on 7 plates. [14 refs.] [Path. Inst., Freiburg im Breisgau, & Peiping Union Med. College, Peking.]

The following are the summary and conclusions :—

"White rats experimentally infected with *Trypanosoma brucei* were studied histologically at different stages of infection. It was found that this infection produces a massive hyperplasia of the reticulo-endothelial system, increased intra- and extramedullary erythro- and myelopoiesis and a very striking hyperplasia of the lymphoid tissue. There is no evidence, however, to show that one element can be transformed into the other.

"The lymphatic hyperplasia, which takes place chiefly in the spleen and the lymph nodes, consists of a great increase in number of large and medium-sized lymphoblasts which, in the early stage of infection seem to be formed directly from certain small lymphoid cells in the lymphoid tissue of these organs. These lymphoblasts, once formed, may either undergo rapid cell division, forming other lymphoblasts, or transform into plasma cells.

"Although the lymphoblasts of the germinal centers and the rest of the lymphoid tissue participate in this generalized hyperplasia, the large and medium-sized lymphocytes and a certain number of the small lymphoid cells undergo no significant change. Especially striking are the small lymphoid cells of the thymus, all of which remain practically unaltered in the whole course of infection. The failure of these cells to take part in this reaction is interpreted by the assumption that they are true small mature lymphocytes which are, with the ordinary histological methods, indistinguishable from the small primitive cells capable of forming larger lymphoblasts. Investigations to substantiate this assumption by the use of supravital technic are now in progress."

W. Y.

LINTON (Richard W.) & POINDEXTER (H. A.). **Artificial Acidosis in *Trypanosoma lewisi* Infections, and its Bearing on the Pathogenic Action of *Trypanosoma equiperdum*.**—*Jl. Experim. Med.* 1931. Nov. 1. Vol. 54. No. 5. pp. 669–680. [7 refs.] [College of Physicians & Surgeons, Columbia Univ., New York.]

Reference is made to recent work which has shown that, in animals experimentally infected with trypanosomes, disturbances in the acid-base equilibrium of the blood are of fundamental significance in the pathogenic action of these organisms. It appeared to the author to be of interest to study the effect of an artificially induced acidosis upon infections of *T. lewisi*, thus reproducing for this organism a chemical environment in the blood somewhat similar to that in which other trypanosomes exhibit such a high degree of virulence. In the experiments described, the alkali reserve in rats was lowered by the intravenous injection of ammonium chloride in 2 per cent. solution. Varying amounts of this solution were given in doses of 0.25 cc. usually at intervals of 20 minutes, and the trypanosomes were counted at intervals during and after the course of injections. Dyspnoea was always present in the animals after two or three injections and was the chief symptom, although some animals showed considerable weakness. All recovered perfectly within a few hours of the last injection.

The following are the summary and conclusions:—

“When the alkali reserve is artificially lowered in rats infected with *Trypanosoma lewisi*, the number of parasites in the blood is increased. The increase is large in the early stages of the disease, and becomes less marked as the number crisis is approached. Near the crisis, and after it, a lowered alkali reserve does not affect the number of trypanosomes.

“It has been shown that the observed increase does not result from a contraction of the capillaries of the inner organs, which would throw a large number of trypanosomes into the peripheral circulation; nor is the increase due to a greater reproductive activity on the part of the trypanosomes. The increase must, therefore, be due to an inhibition of the destructive forces of the host.

“It is suggested that the known production of organic acids by the pathogenic trypanosomes plays a similar rôle in inhibiting the destructive mechanism of the host, and is therefore of significance in the pathogenic activity of these organisms.”

W. Y.

NATTAN-LARRIER (L.). La coloration des trypanosomes dans les coupes histologiques. [**Staining of Trypanosomes in Sections.**]—*Rev. Méd. et Hyg. Trop.* 1931. July–Aug. Vol. 23. No. 4. pp. 226–230. [4 refs.]

After referring to the technique used by the reviewer (1911) and by STEVENSON (1917) for the staining of trypanosomes in sections of infected tissues, the author passes to a description of the methods used by him in his study of *T. maroccanum*, and especially on the question of its passage from the mother to the foetus. He recommends the following technique:—

The sections, which should be as thin as possible, are deparaffinated by toluene and then passed through the alcohols into water. After staining for 20 minutes in Kernschwartz they are washed thoroughly in water and stained by one of the following methods:—

(1) *Kernschwartz-Giemsa*. After staining in Kernschwartz, the section

is left for 10 to 20 hours in a dilute solution of Giemsa, prepared as follows :—

Methyl alcohol	...	...	...	...	1 cc.
Giemsa fluid	...	...	...	...	0.8 cc.
Sodium bicarbonate solution	...	...	...	...	1 drop
(5 per cent.)					
Distilled water	...	...	...	...	33 cc.

The section is differentiated in 90 per cent. alcohol, dehydrated in absolute alcohol, passed through toluene, and mounted in cedar oil.

(2) *Kernschwartz method of Laveran*. After staining with Kernschwartz, the section is stained for 10 to 20 minutes with a mixture of Borrel blue and eosin. This is made by adding one volume of Borrel blue to 9 volumes of distilled water and, immediately before use, one part of this dilute solution of Borrel blue is mixed with 2 parts of a 1 in 10 solution of eosin.

In other methods thionine blue and haemalum eosin are used as the counter stains. All four techniques give good results, although the authors give the preference to the first two methods.

Stress is laid on the importance of good fixation. Small pieces of tissue should be fixed in saturated sublimate or in acetic sublimate. The author also believes that Flemming solution, Bouin solution, and Dubosq and Brasil solutions would give excellent results.

W. Y.

- V. BRAND (Th.) & REGENDANZ (P.). Ueber Störungen des Kohlenhydratstoffwechsels bei der Trypanosomiasis des Kaninchens. [**Disturbance of Carbohydrate Metabolism in Trypanosomiasis of the Rabbit.**]—*Biochem. Ztschr.* 1931. Nov. 27. Vol. 242. No. 4/6. pp. 451-468. [19 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The following are the conclusions :—

In the course of *T. brucei* infections in rabbits a pronounced hypoglycaemia is met with in the very last (agonal) stage and a less marked hypoglycaemia in the stage (terminal) immediately preceding this; the condition is not related to the consumption of sugar by the parasites.

In rabbits which have died of the infection, the glycogen content of the liver and muscles is greatly diminished, whilst in the terminal stage the decrease of glycogen is not so pronounced.

On the other hand, in the course of the infection a disturbance of the glycogen storage of the liver is demonstrable if the infected animals are given large amounts of cane sugar; this can proceed so far that notwithstanding the administration of 25 gm. of sugar per kilo. of body weight in 24 hours no glycogen is stored in the liver. The glycogen content of the muscles is likewise decreased.

There is no relationship between the capacity to store glycogen and the height of the blood sugar.

Since the administered sugar is absorbed there must be a disturbance of the glycogen-forming function.

Notwithstanding the administration of much sugar the blood sugar content may fall in the terminal stage of the infection.

The cause of the disturbance of metabolism is to be sought in a poisonous action of the trypanosomes on the organs in question or on their regulation mechanism.

W. Y.

CORSON (J. F.). **A Note on Experimental Infection of Guinea-Fowl and Francolin with *Trypanosoma rhodesiense*.**—*Jl. Trop. Med. & Hyg.* 1931. May 15. Vol. 34. No. 10. p. 133.

A guinea-fowl and three francolins caught at Maswa, Tanganyika, were injected in the leg muscles with *T. rhodesiense*, and subinoculations of their blood were made subsequently into white rats. The guinea-fowl and one francolin transmitted the infection; details are given in a short table.

W. Y.

LEDENTU (G.). Groupes sanguins et *Trypanosoma gambiense*. [**Blood Groups and *T. gambiense*.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 664-667.

It has been known for a long time that human serum presents great variations in respect of its action on *T. gambiense*. The author has enquired whether these differences are in any way related to the blood groupings. In his experiments he used commercial serum of Groups II, III and IV and a fixed virus conserved in mice which killed in four days.

The agglutination power depended greatly on the sample. At ordinary temperatures the potent sera, i.e., those strongly agglutinating human erythrocytes, exhibited similarly a marked agglutinating action on the trypanosomes. The agglomeration was always immediate and considerable, so that isolated trypanosomes were very rare. With sera II and III the trypanosomes were paralysed in a few minutes; with serum IV their motility persisted for half an hour notwithstanding a good and rapid agglutination.

The author then passes to a consideration of protective and curative power of the various types of serum for *T. gambiense* infections of mice. His conclusions are :—

The sera of the Groups II, III and IV can be classified in this order of descending power in so far as the activity against *T. gambiense* is concerned.

Group II appears to be especially endowed with protective properties which are by no means negligible in the case of active samples.

It would be of interest to attempt to correlate these experimental facts with the incidence of human trypanosomiasis amongst the natives of Africa.

W. Y.

SCHILLING (Claus) & BORCHI (Bruno). Die Bedeutung der Schleimhaut als Eintrittspforte bei Trypanosomeninfektionen. I. Mitteilung. [**Significance of Mucous Membrane as Portal of Entrance for Trypanosome Infections.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Jan. 16. Vol. 113. No. 2 & 3. pp. 586-589.

White rats infected with *T. lewisi* were placed in a wire cage in a glass jar, the bottom of which was covered with sawdust. Fleas were then added from a dog. After 24 hours the infected rats were replaced by normal rats, and 4 days later it was possible to collect infected fleas from these with certainty. Such fleas were then ground up in the water of condensation from N.N.N. medium and the emulsion injected with the greatest care to prevent mechanical injury, into the mouths of normal rats: these animals showed *T. lewisi* in their blood 4 to 6 days later.

Attempts were then made to infect rats orally by the blood forms ; no success was obtained in 16 experiments. Six of these animals were then tested by the introduction of flea-forms of the trypanosome into the mouth, but in no instance was an infection obtained. Second attempts were made in three of these refractory rats, but these likewise failed. An attempt was then made to infect the animals by the injection of blood forms intraperitoneally. In one animal a regular infection occurred ; in a second an abortive infection, and the third animal was completely refractory. Other experiments were conducted along similar lines. In all, of 13 rats, into the mouths of which blood trypanosomes had been introduced, 11 (84·6 per cent.) proved refractory when attempts were made later to infect them by oral introduction of flea forms—a procedure which in normal rats gives 87 per cent. of infections. There thus appears no doubt that the insusceptibility for re-infection with flea forms, via the oral mucous membrane, is due to a development of active immunity. There is even evidence of immunity against the more virulent infection resulting from intraperitoneal injection of the blood forms. If this immunity is not complete, it is at least sufficient to result in the development of a mild infection.

Experiments were then conducted to ascertain whether the application of the blood forms of the pathogenic trypanosomes to the oral mucous membrane of rats would give rise to any immunization. These experiments show that even in the case of these infections there is evidence of the production of a feeble immunity when the trypanosomes are allowed to penetrate the undamaged mucous membrane.

W. Y.

ETINGER-TULCZYNSKA (R.). Nasale Infektion von Mäusen und Ratten mit Trypanosomen und Spirochäten. [**Nasal Infection of Mice and Rats with Trypanosomes and Spirochaetes.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Jan. 16. Vol. 113. No. 2 & 3. pp. 590–596. [7 refs.] [Robert Koch Inst., Berlin.]

Experiments are recorded which show that mice are easily infected with *T. brucei* through the undamaged nasal mucous membrane by small numbers of parasites ; the incubation period is definitely longer than after injection. Rats are similarly easily infected ; in a proportion of the animals the infection assumes a chronic relapsing type. Further experiments showed that mice could be regularly infected with relapsing fever spirochaetes in the same way. In all cases it was far easier to infect through the nasal mucous membrane than through the mouth.

W. Y.

NATTAN-LARRIER (L.) & NOYER (B.). Voies d'introduction et activité des sérums anti-trypanosomes. [**Activity of Anti-Trypanosomal Serums according to Channel of Introduction.**]—*C.R. Soc. Biol.* 1931. Dec. 4. Vol. 108. No. 35. pp. 856–859.

Experiments are recorded which show that the curative and protective action of human serum in trypanosomal infections in mice is definitely greater when the serum is administered intravenously than when it is given subcutaneously or intraperitoneally.

Six mice were infected with *T. brucei* and five of them treated by an

intravenous injection of 1/10, 1/20, 1/40, 1/100, 1/200 cc. respectively of human serum; the sixth animal served as a control. The mice given 1/10 cc. and 1/50 cc. were definitely cured; the smaller doses generally caused only a temporary disappearance of parasites from the blood. It is remarked that 1 cc. of human serum when given subcutaneously never cured, a relapse always occurring. In order better to study the value of the three methods of administration, three lots of mice were given 1/100 cc. of human serum by the intravenous, subcutaneous and intraperitoneal routes respectively. Neither the subcutaneous nor the intraperitoneal injections sufficed to clear the blood of trypanosomes, but life was prolonged for 3 days by the intraperitoneal injections; the intravenous injections were followed by cures.

Similar experiments are recorded dealing with the protective action of human serum when given by each of the three routes. It was found that here again the intravenous routes gave much the best results. Other experiments showed the same facts to hold in the case of immune serum developed by rabbits against *T. maroccanum* var. *cameli*.

W. Y.

KLIGLER (I. J.). **Susceptibility and Resistance to Trypanosome Infection. VIII.—*In vitro* Demonstration of Specific Agglutinating and Trypanolytic Antibodies in the Serum of Infected Guinea-Pigs.**—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 377-392. [10 refs.] [Dept. of Hyg. & Bact., Hebrew Univ., Jerusalem.]

The course of a trypanosome infection in guineapigs, rabbits, and higher animals is characterized by its intermittent character. Previous work by the author indicates that the mechanism of relapse, as well as that of resistance to re-infection, is associated with the cellular defences of the body. It has been shown that relapse can be brought about by exhaustion of the cellular defence by injection of olive oil into guineapigs and that splenectomy greatly lowers the resistance of rats to an infection [this *Bulletin*, Vol. 27, p. 240]. These findings, however, do not account for the sudden disappearance of trypanosomes in infected animals, more particularly in the guineapig.

The work of many authors has shown that following a trypanolytic crisis in guineapigs there is a specific lytic substance present in the serum. MASSAGLIA (1907) showed that the serum of an animal which was slightly lytic before a crisis became strongly so afterwards. This was confirmed by LEVADITI and MUTERMILCH (1909), who also found that a strain of trypanosomes could be rendered resistant to the serum *in vitro* by a few minutes contact with it. LEVADITI and MCINTOSH (1910) repeated and confirmed these observations and were able to develop resistant strains by *in vitro* contact with immune serum. In these experiments most of the trypanosomes were killed, but a few remained, and these, when injected into mice, gave rise to strains which were resistant to the action of the particular immune serum. The process was interpreted as one of selection. ROSENTHAL (1913), however, postulates the presence in the serum of a substance, antagonistic to the lytic substance, which increases the resistance of trypanosomes to the action of the serum.

The author's previous attempts to demonstrate humoral antibodies either *in vivo* or *in vitro* have given negative or variable results. The recent work of the reviewer and his colleagues, who were able to demonstrate *in vitro* a pronounced trypanolytic effect of normal human serum

on certain pathogenic trypanosomes [this *Bulletin*, Vol. 27, p. 804] has prompted the author to reinvestigate the trypanolytic properties of guineapig and rat serum following a crisis.

The technique employed differed in some respects from that of the reviewer and his colleagues. The testing medium was a diluted serum consisting of five parts guineapig serum, three parts glycosal solution, and two parts phosphate buffer mixture, M/30 of pH 7.8. The tubes were incubated at 25° C. to 28° C. Under these conditions the trypanosomes remained viable and infectious for at least three days and the effect of the serum could be followed without difficulty.

"The usual procedure was as follows: 1.0 cc. of the serum-glycosal mixture was added to a series of tubes. To these were added, first, decreasing dilutions of the serum to be tested, and then equal amounts of a trypanosome suspension taken from an infected rat. The amount of trypanosome suspensions added was usually graded to give a final concentration of not more than 5,000 trypanosomes per cubic millimetre of medium. The suspension was then placed in the incubator and examined at stated intervals. In some experiments rats were infected after given periods in order to ascertain the infectivity of the treated trypanosomes."

Details of a considerable number of experiments are given. The conclusions are:—

"1. Serum of guineapigs infected with *Tr. evansi* contains trypanolytic substance, the concentration of which varies in different animals and in the different stages of the infection.

"2. The lytic effect is specific, affecting only some of the trypanosomes in a suspension. Even twenty-four hour contact of serum and trypanosomes fails to destroy all of the trypanosomes in suspension. The remaining trypanosomes are still virulent and resistant to the action of the serum. This resistance is lost after repeated passage in rats, the strains becoming once more susceptible to the lytic effect of the serum specific for the passage strain.

"3. In one experiment it was possible to obtain a mixed polyvalent serum which sterilized a suspension in twenty-four hours.

"4. No corresponding trypanolytic substance could be detected in serum of infected rats.

"5. As the infection progresses the lytic effect of the serum diminishes."

W. Y.

NATTAN-LARRIER (L.) & NOYER (B.). Ultrafiltration et action anti-trypanosome du sérum humain. [**Ultrafiltration and Anti-trypanosomal Action of Human Serum.**]*—C.R. Soc. Biol.* 1931. Dec. 11. Vol. 108. No. 36. pp. 931-934. [2 refs.]

The authors show that when human serum is passed through an ultra-filter, the trypanocidal substance is carried through, but the alexine is retained. The filter, which consists essentially of a collodion membrane, is described elsewhere.* The filters have now been standardized and designated by the letter K followed by a number indicating the number of litres of water which in 24 hours traverses a membrane of 1 sq. metre under a pressure of 1 metre of water.

In preliminary work it was determined how the various filters dealt with alexine. K3000 under an aspiration of 10-15 cm. of Hg allowed all the alexine to pass in 15 mins.; K600 under an aspiration of 20 cc. of Hg for 2½ hours retained alexine completely as also did K250. Subsequent experiments were consequently all conducted with filters

* NATTAN-LARRIER and NOYER. *C.R. Soc. Biol.* 1930. Vol. 105, p. 630.

K600 and K250. They showed that such filters allowed the (trypanocidal) curative substance of human serum to pass through somewhat diminished in power; the protective action was more markedly lost.

The authors are inclined to the view that their experiments indicate that the curative power, and the protective power, of human serum are dependent on two substances which have not the same filterable index.

W. Y.

GILL (C. W. Hope). **The Specificity of the Kahn Test Unaffected in Human Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 197–200. [3 refs.]

The object of the investigation was to determine whether the specificity of the Kahn test is affected in human trypanosomiasis. Two groups of sera were tested. Group A was drawn from Hausas at Gadao, the headquarters of the tsetse investigation in Nigeria. Group B was drawn from pagans of the Plateau Province, about 200 miles south of Gadao.

"Group A. Hausas attending the out-patient clinic at Gadau.

"Series 1. Sleeping sickness cases in which *T. gambiense* was demonstrated either in the gland juice or in thick blood films: Out of 39 sera, three were positive, and 36 (92.3 per cent.) were negative to the test.

"Series 2. General out-patients other than sleeping sickness cases (control series): Out of 36 sera, 15 were positive, and 21 (58.3 per cent.) were negative to the test.

"Group B. Pagans drawn from the Jaba and Kagoma tribes, Plateau Province.

"Series 3. Sleeping sickness cases in which *T. gambiense* was demonstrated by Dr. Paisley: Out of 204 sera, four were positive, and 200 (98.0 per cent.) were negative to the test.

"Series 4. Apparently healthy adult males and females selected at random from the general population (control series): Out of 110 sera, two were positive, and 108 (98.2 per cent.) were negative to the test.

"The percentage rate of sleeping sickness cases giving a positive Kahn test is therefore no higher than the syphilis rate of the controls. Yaws in this part of Nigeria is practically unknown.

"It is concluded that the specificity of the Kahn test is unaffected in human trypanosomiasis."

W. Y.

HASEGAWA (Kiichi). Experimentelle Studien ueber die Trypanosoma-Immunisierung. [**Experimental Studies in Trypanosome Immunization.**]—*Fukuoka-Ikwadaigaku-Zasshi*. 1930. Nov. Vol. 23. No. 11. [In Japanese. German summary pp. 85–88.] [Faculty of Med., Kyushu Imperial Univ., Fukuoka, Japan.]

The amount of antibody produced in response to the injection of heated trypanosome vaccine is, as a rule, less than that resulting from unheated vaccine. The influence of heat on agglomeratinin formation is greater than on agglutinin formation.

Rabbits were immunized with *T. gambiense* vaccine and 7 days later were either injected with *T. lewisi* vaccine or with *B. coli* vaccine or a 5 per cent., 10 per cent. or 15 per cent. solution of deuterio-albumose. The experiments showed that the hetero-vaccine or the albumen increased the formation of agglomeratinins and to a less extent of the agglutinins. The more closely related vaccine (*T. lewisi*) acted more potently than did the other injections.

The influence of salts of heavy metals on antibody formation was next examined. The chlorides of manganese, cobalt, nickel and zinc were

injected intravenously in 1/10 to 1/1,000 Mol. sol.). It was found that the agglomeratinin formation was stimulated by this means as to a less extent was also that of the agglutinins.

Finally, the result of feeding immunized rabbits on lipoids (cholesterin and lecithin) was examined. Whilst lipid feeding for a short period had no influence on normal antibody formation, it had a specific effect on the immune body formation : cholesterin increases this and lecithin inhibited it. There was not found to be any relationship between the cholesterin content of the immune serum and its immune titre.

W. Y.

- i. HASEGAWA (Kiichi). Morphologische Untersuchungen ueber die Trypanosomen-Agglomeration. [**Morphological Investigations on Trypanosome Agglomeration.**]—*Fukuoka-Ikuadaigaku-Zasshi*. 1930, Dec. Vol. 23, No. 12. [In Japanese. German summary p. 89.]
- ii. —. Ueber den Einfluss der Komplemente auf die Agglomeration und Agglutination bei Trypanosomen-Immunisierung. [**The Influence of Complement on Agglomeration and Agglutination in Trypanosome Immunization.**]—*Ibid.* [In Japanese. German summary p. 90.]
- iii. —. Ueber die Isolierung der Agglomeratinine und Agglutinine nach der Castellanischn Absorptions-Methode. [**The Isolation of Agglomeratinin and Agglutinin by Castellani's Absorption Method.**]—*Ibid.* [In Japanese. German summary pp. 90–91.] [Kyushu Imperial Univ., Fukuoka, Japan.]

i. There are three types of agglomeration depending on the titre of the immune serum and its degree of dilution. Agglomeration due to sera of high titre takes place immediately and is marked ; this is the first form which assumes the appearances of a branch or rope. With sera of lower titre the second form is seen (glomerulus form) ; and with sera of low titre the third or rosette form. [Illustrations are given in the Japanese paper.] As the result of observations made with blepharoblastless trypanosomes produced by injections of pyronin, the author reaches the conclusion that this structure has no special significance on the mechanism of agglomeration.

ii. Trypanosome immune serum was mixed with various kinds of active complement—guineapig, sheep, hen, rabbits, etc.—and the influence on agglomeration and agglutination observed. The results showed that the active complement increased the agglutination reaction and caused a rise in the agglutination titre. The results varied somewhat according to the source of the complement. Complement exerted no influence on agglomeration.

iii. Agglomeratinin and agglutinin were isolated by Castellani's absorption method.

W. Y.

- FOURCHE (J. A.) & HAVEAUX (G.). Germanine et tryponarsyl appliqués préventivement contre la trypanosomiase. [**Prevention of Trypanosomiasis by Germanin and Tryponarsyl.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 557–562.

The authors have repeated the observations of Fourche and RICKLIN on the prophylactic value of "Bayer 205" [this *Bulletin*, Vol. 26, p. 193]. The present observations were made at the end of 1929 and beginning of 1930 in the district of Babinji (Kasai).

The following are among the conclusions :—

We are more than ever persuaded of the preventive qualities of Germanin under the following conditions :

1. The preventive treatment ought to be given to the healthy whilst the infected are being treated.

2. The preventive treatment should be reserved for the healthy and all doubtful cases should be strictly excluded.
3. A minimum of 2 injections of germanin should be given.
4. The period of protection should not be considered to be longer than a maximum of 6 to 7 months.

It is possible that certain failures are due to the non-observance of one of these conditions.

The preventive action of tryponarsyl given in two successive doses is definitely shorter, but it is still manifest after six months.

W. Y.

MESNIL (F.). Trypanosomiasis et maladie du sommeil. [**Trypanosomiasis and Sleeping Sickness.**]—*Bull. Acad. Méd.* 1931. Oct. 13. Year 95. 3rd Ser. Vol. 106. No. 31. pp. 199-207.

A general account of the disease which requires no special notice here.

W. Y.

MAZZA (S.). Tatou porteur de germes de *T. cruzi*. [**The Armadillo as a Carrier of *T. cruzi*.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 627-628. With 2 text figs.

The author points out that the tatou is apparently but little known in Europe: its real name is *Choctophractus vellerosus* and not *Dasyus novemcinctus* as stated in KOLLE, KRAUS, and UHLENHUTH's "Handbuch der Pathogenen Microorganismen." Photographs of each are given.

W. Y.

BONACCI (H.). Nouveau milieu de culture pour le *Trypanosoma cruzi* Chagas, 1909.—*Folia Biol.* Buenos Aires. 1931. May. No. 2. pp. 3-4.

MISCELLANEOUS.

PENSO (Giuseppe). Sull' azione patogena della "Giardia intestinalis."
[**The Pathogenic Action of *Giardia intestinalis*.**]—*Policlinico*.
Sez. Prat. 1931. July 6. Vol. 38. No. 27. pp. 949-954.
With 7 text figs. [13 refs.] [Inst. of Med. Parasit., Univ., Rome.]

The author is firmly convinced that *Giardia* is a pathogen. He divides cases into 3 types: 1. Non-intestinal, associated with anaemia and nervous disorders, regarded as of toxic origin; 2. Intestinal, with signs of entero-colitis; 3. Acute, with dysenteric symptoms. He mentions also a biliary type in which *Giardia* is present in the material removed by duodenal sound. Where cysts only are found in the faeces, the stool is normal in form, consistency and colour; where cystic and vegetative forms are present the stool is yellowish, pultaceous and contains an excess of mucus; where vegetative forms only are seen and these in abundance, the stool is yellowish, gelatinous, with much mucus and blood-streaked, in short dysenteric. In severe cases sections of the intestine show numerous parasites between the villi, adherent to the epithelial cells which are themselves eroded and degenerating. He did not find them penetrating the mucosa.

H. H. S.

PETROWYCH (A.). Beitrag zur Behandlungsmethode Lambliosekranker. [**Treatment of Giardiasis.**]—*Deut. Med. Woch.* 1931. June 5. Vol. 57. No. 23. pp. 975-976. [16 refs.] [1st Soviet Municipal Hosp., Krasnodar.]

The author's observations lead him to the conclusion that the pathogenicity of *Giardia* is shown by the fact that the symptoms which troubled the patient ceased on instituting effective anti-*Giardia* treatment. This must be controlled by search of duodenal washings for vegetative forms of the parasite, and of the stools for the encysted forms. Duodenal lavage can disinfest only the upper part of the alimentary canal. Best results have followed intravenous injections of neo- and novo-salvarsan with periodical lavage of the duodenum with 25 per cent. mag. sulph. solution.

H. M. Hanschell.

JONCKHEERE (A.). A propos d'un cas de giardiase (lambliaose) autochtome. [**A Case of Autochthonous Giardiasis.**]—*Bruxelles-Méd.* 1931. July 5. Vol. 11. No. 36. pp. 1064-1069. [22 refs.]

The author describes a case of autochthonous giardiasis, the first she says from Belgium. The history, which appeared to go back for 6 years, was one of diarrhoea with pain in abdomen, loss of flesh and occasional bouts of fever. The parasites were easily found in the stools and by duodenal tubage. The diagnosis was fermentative diarrhoea and giardiasis. Stovarsol was not tolerated, treparsol did little good, but when pyrethrine (chrysemine of commerce) was associated with it the flagellates disappeared, and several subsequent examinations had not discovered them [period not stated].

In 75 stool examinations of patients who have not left Belgium the author has found giardia in 8.

A. G. B.

MARMO (Achille). "Giardiasi." Primi casi accertati in Eritrea. [**Giardiasis ; First Cases recorded in Eritrea.**]—*Arch. Ital. Sci. Med. Colon.* 1931. June 1. Vol. 12. No. 6. pp. 336-371. With 20 figs. on 1 plate. [4 pages of refs.] English summary (9 lines).

The author gives details of six cases out of 26 mentioned, the ages of the patients varying between 10 months and "old age." He treats his cases with thymol and stovarsol, together with emetine if *E. histolytica* is present.

H. H. S.

PERUZZI (Mario). Sull' etiologia delle febbri enteroidi, dissenterie e diarree di Alessandria d'Egitto. [**The Aetiology of Enterica, Dysentery and Diarrhoea in Alexandria.**]—*Ann. di Med. Nav. e Colon.* 1931. Sept.-Oct. 37th Year. Vol. 2. No. 3-4. pp. 572-591. [1 ref.] [Benito Mussolini Italian Hosp., Alexandria.]

During the 8 months July 1930-February 1931, the author examined 198 specimens, serologically by agglutination and culturally from the faeces. In 86 of these he was able to identify the organism associated with the clinical condition and he concludes as follows :

Group 1. Parasitic affections 14, including *Amoeba*, *Lambli*a, *Blastocystis*, *Schistosoma*.

Group 2. Enteric and bacillary dysentery 37 : *B. typhosus*, *B. paratyphosus*, *B. dysenteriae*, *B. paradysenteriae*.

Group 3. The same associated with *Vibrio* *thrix zeylanica*, 8.

Group 4. Enteric-like fevers, dysenteric entero-colitis and diarrhoea, 27 : *B. columbensis*, *B. morgani*, *B. ceylonensis*, *B. madampensis*, *B. metadysentericus*, *B. enteroides*.

He calls attention particularly to group 4, in that, if the examinations had been restricted to the usual enterica, dysentery and paradysentery organisms, these would have been overlooked, and also to the fact that CASTELLANI'S metadysentery bacilli are associated with chronic diarrhoea and symptoms of auto-intoxication.

H. H. S.

CASTELLANI (Aldo). **On a Common Type of Chronic Colitis which is Seldom Recognized.**—Reprinted from *Practitioner*. 1931. May. Vol. 126. pp. 537-545. [17 refs.]

In this article the author draws the attention of clinicians to the colitis which is etiologically related to the organisms he has often described as metadysentery bacilli. Three illustrative cases are given.

W. F. Harvey.

VAN HOORDE. Traitement des diarrhées par l'amiphène. [**Treatment of Diarrhoea by Amiphene.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Mar. 31. Vol. 11. No. 1. pp. 59-65.

Amiphene is "dioxypheñoiodo sulphonate de potasse," a powder containing 31 per cent. of iodine and soluble in water. It is given in capsule which in an alkaline medium dissolves with the liberation of iodine. It was administered in some 20 cases of Europeans at Leopoldville, with diarrhoea described as tropical or putrefactive, with good effect.

A. G. B.

STURTON (S. D.). **Oedema and Ascites in Chinese Patients. Being a Dissertation for the Degree of M.D., Cantab.**—*China Med. Jl.* 1931. July. Vol. 45. No. 7. pp. 584–625. [20 refs.]

Since 1921 the author, at a Mission Hospital of 400 beds at Hangchow, has been impressed with the large number of out-patients suffering from ascites, or oedema of the lower limbs, or both.

He divides the cases into—diseases of world-wide distribution—heart, kidney and liver disease, etc.; “tropical” diseases—beriberi, helminthiasis (ankylostomiasis, fasciolopsis infection, ascariasis); and cases without any obvious organic cause. It is of these last that the author writes in his paper. The figures for 1929 are, splenomegaly 17 outpatients and 4 inpatients, ascites 13 and 3, oedema 12 (outpatients). These are again divided into cases with and cases without splenomegaly.

Oedema or ascites with splenomegaly. In these cases there is no organic lesion other than enlarged spleen; blood and urine examination is negative, and no ova have been found in the faeces. It is noted that 60 miles to the north 7 per cent. of the population is infected with schistosomiasis, but none is found at Hangchow. Kala azar is unknown south of the Yangtse. Benign tertian malaria is common, but would not in the author's opinion account for the splenic enlargement. He finds that a heavy dose of X-rays or 5 grains of pot. iod. ter die will reduce the spleen by 25 per cent. No indication is given of the fate of these patients.

Oedema or ascites without splenomegaly. Notes are given of 19 of these cases and a table shows the principal features. All were inpatients and 18 were males. The history varied from 2 weeks to over a year. Possible diagnoses are, wet type of beriberi, epidemic dropsy, hunger oedema, residual effects of fluke disease, malarial anasarca, tissue acidosis, and these possibilities are discussed. The author rules out beriberi and hunger oedema. The signs and symptoms of this disease and of epidemic dropsy are compared in a table; they differ in most respects. Hangchow is on the north bank of the Chien Tang estuary, to the south of which lie the centres of *Fasciolopsis buskii* infestation. The oedema may persist when the ova have been banished by treatment. All patients therefore who came from the endemic areas were treated with oil of chenopodium: in no case have flukes been seen. He thinks that malaria may play a part in the aetiology and “clinical evidence points strongly to the possibility of tissue acidosis associated with debility.”

A. G. B.

MITRA (Subodh). **Anaemia of Pregnancy.**—*Indian Med. Gaz.* 1931. July. Vol. 66. No. 7. pp. 363–379. With 4 graphs & 3 figs. on 1 plate. [18 refs.]

In the years 1926–30, out of 1,883 labour cases in the Women's Hospital at Calcutta, the author has had 86 cases of anaemia of pregnancy; 25 died in hospital, and the infant mortality was 52·8 per cent. The chief features of these cases are displayed in an eight-page table. The conclusions are as follows:—

“1. Although rare in Great Britain and on the Continent, anaemia of pregnancy is very common in India.

" 2. The clinical course is very rapid ; and the patient is cured or dead within 6 weeks.

" 3. The mortality, both maternal and foetal, is very high.

" 4. Definite histological changes are found in the liver pointing to a toxæmia of pregnancy. There is degeneration of cells at the centre of the hepatic lobule, and hæmorrhagic areas beyond it, while the peripheral portion is healthy. These changes have been found in four consecutive cases.

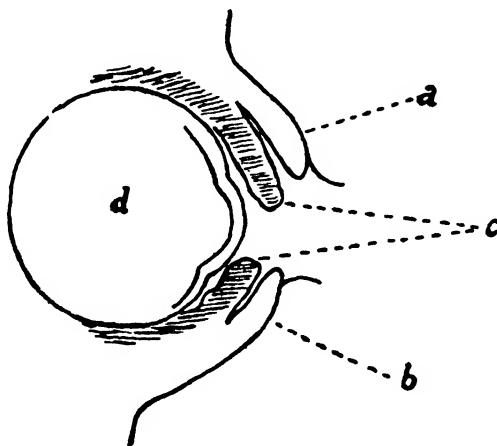
" 5. Thus from the ætiological standpoint it is considered to be a kind of toxæmia of pregnancy.

" 6. Fractional deep X-rays have been used to stimulate the reticulo-endothelial apparatus thereby increasing the immunity and the formation of all kinds of blood cells."

A. G. B.

MARMO (Achille). Forma rara di granuloma sottocongiuntivale osservata in Eritrea. [**An Unusual Form of Subconjunctival Granuloma in Eritrea.**].—*Ann. di Med. Nav. e Colon.* 1931. May-June. 37th Year. Vol. 1. No. 5/6. pp. 310-313. With 2 figs. on 1 plate. [1 ref.]

The condition here described affects individuals between 15 and 40 years of age, chiefly males. When fully developed there results a painless growth, reddish in colour, of fleshy or even cartilaginous consistence, not ulcerating, but adherent to the conjunctiva. It usually starts at the internal angle of the eye, occasionally at the external, and at first a probe can be passed between the lid externally and the ocular conjunctiva internally and the



Mesial section of the globe and eyelids. a & b=lids, c=growth, d=eyeball.

[Reproduced from *Annali di Medicina Navale e Coloniale*.]

growth ; later this cannot be done and the palpebral fissure is reduced to a "canal" of 3-4 mm. width. At this later stage, the conjunctiva, palpebral and ocular, is firmly adherent to the new growth, which is not encapsulated. Histologically, the newly formed tissue is largely fibrous, or granulomatous with lymphoid cells invading the normal tissue, the periphery is vascular. In some there are foci of amyloid or myxomatous degeneration. No special bacteria or protozoa have been found on repeated examination. McALL has recorded a similar condition observed by him in Central China [see this *Bulletin*, Vol. 18, p. 81].

H. H. S.

- i. VENKATARAMAN (K. V.). (A) Report on "Ubbumariyayee" in Pennadam.—*Rep. King Inst. of Preventive Med., Guindy for Half-Year 1st Apr. to 30th Sept. 1930.* Appendix II, May & June 1930. pp. 27-29.
- ii. —. (B) Report on Sprue in Golden Rock.—*Ibid.* pp. 29-30.
- iii. THEODORE (J. H.). (C) Report on the Existence of Bowel Complaints in Golden Rock.—*Ibid.* pp. 30-31.

i. "Ubbumariyayee" is the local name of a disease occurring in the village of Pennadam, on the southern border of the South Arcot district, Madras, to which the attention of the Health Officer was called in March 1930 by the report of a number of deaths. He visited Pennadam and found 2 patients confined to bed, 3 others too weak to get about, and at neighbouring villages 6 more together with 60 others who had nearly recovered from the disease, and many who were perfectly well, but gave a history of having been attacked. There had been 17 deaths. Twenty cases were investigated and the following is a summary of the main features of the condition.

At the onset the chief symptoms were flatulent distension with diarrhoea, 5 or 6 motions in the day, not copious and rarely watery, and not confined to the early hours; this abated in 2-20 days to recur after varying intervals, during which there were anorexia and weakness. Many complained of soreness of the mouth, particularly painful on taking spicy food, and some showed a red tongue with inflamed edge. Fatal cases developed oedema of legs and ascites and a terminal dysentery. There was no fever at any time. Physical examination revealed little beyond anaemia, more or less severe, and slight wasting. Four of the bed-ridden patients had anasarca and ascites, one a little pleural effusion and two oedema of legs. Among 60 whose faeces were examined there were 45 passing hookworm ova, 6 with *E. histolytica* cysts, one with *Bact. dysenteriae* Flexner, two with *Bact. faecalis-alkaligenes*.

The combination of dyspepsia, flatulence, diarrhoea, anaemia and soreness of mouth suggested sprue, but the general appearance did not bear this out; the emaciation was not marked, the stools were neither frothy nor pale, and the affection of a large number almost simultaneously is against this diagnosis. Other possibilities are epidemic dropsy and beriberi. Some dietetic deficiency is probable since rice is the staple article of diet; it is mostly stored in front of the houses in stacks made of bundles of straw and exposed to rain. It is usually eaten after "parboiling." Lt.-Colonel KING, Director of the King Institute, Guindy, proposes to send an investigation unit to Pennadam after the rains to observe the condition further.

ii. A condition closely resembling Ubbumariyayee was studied by Dr. Venkataraman among railway employes at the Golden Rock Colony, Trichinopoly, in July 1930. He saw 16 patients and the clinical state, though not typical of sprue, he considered resembled this rather than Ubbumariyayee. There was more chronic diarrhoea, with copious, frothy, foul, fermenting stools, progressive emaciation, severe anaemia and a raw glazed tongue. He was informed that "the response of these cases to treatment with calcium lactate and parathyroid extract and liver extract had been most encouraging." Various bacilli were isolated from the stools—a non-agglutinating *Bact. dysenteriae* Flexner, *Bact. morgani*, *Bact. enteritidis*, *Bact. pseudo-carolinus*, Monilia with two exceptions of the wild yeast, non-maltose fermenting, type—all very probably secondary invaders.

iii. Dr. Theodore comments on Lt.-Colonel ACTON's findings of the above and other organisms as aetiological factors in the syndrome of sprue, sprue-like diseases and chronic diarrhoea in India and proposes that a bacteriological unit be stationed at Golden Rock for a period of at least nine months to include a rainy season and cover the time when bowel complaints are at their worst.

H. H. S.

D'HOOGHE. Essai sur l'étude de la fièvre paratyphoïde " C ". [**Paratyphoid C Fever.**]*—Ann. Soc. Belge de Méd. Trop.* 1931. June 31. Vol. 11. No. 2. pp. 169–188. With 6 charts.

It is very essential that the diagnosis of paratyphoid fever C should not be solely dependent on the laboratory verdict. The occurrence of sixteen cases (Katanga) has enabled the author to set out in some detail the pathology, the syndrome and the differential diagnosis of this disease. The lymphoid tissues of the small intestine seem only to be superficially affected and the spleen is only moderately enlarged. Certain differences from typhoid fever are apparent in the temperature curve, which attains 39 to 40° C. in 2 or 3 days, or even more abruptly. At its height the temperature may be septicaemic in type and defervescence may be sudden or by lysis. The stupor of typhoid fever is usually wanting. Other features, which lead to a suspicion of paratyphoid C, are meningeal symptoms and jaundice. Prognosis is rather serious and in the 16 cases here referred to there were 7 deaths. Treatment is mainly symptomatic and as a prophylactic measure the author recommends T.A.B.C. vaccine.

W. F. Harvey.

MANOUSSAKIS (E.). Traitement des troubles quiniques de nature idiosyncrasique. [**Treatment of Idiosyncrasy to Quinine.**]*—Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. July 20. Year 47. 3rd Ser. No. 25. pp. 1426–1429. [1 ref.]

The author has shown that one can prevent the symptoms of idiosyncrasy to quinine by giving each dose before the previous one has been excreted [this *Bulletin*, Vol. 28, p. 64]. An indispensable condition of tolerance, he writes, is the presence of quinine in the system. He here quotes seven more cases, one in detail.

A soldier with malaria since 1925 was unable to get rid of his infection owing to quinine idiosyncrasy. The author injected 10 cgm. of quinine on September 19th, producing a scarlatiniform rash, fever, vomiting, faintness. The next day and each day till September 29 the patient took 1 gm. in three injections daily without disturbance. On October 4, after five days' interruption, injection of 25 cgm. was followed by a severe reaction whereas the two following days the same dose was well borne. The same series of events occurred after another interruption. All the patients left hospital cured of their malaria.

A. G. B.

BOYD (T. C.), NAPIER (L. Everard) & ROY (A. C.). **The Distribution of Antimony in the Body Organs.***—Indian J. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 285–294. [1 ref.]

The authors estimated the distribution of antimony in the tissues and organs of monkeys after the administration of Bayer 693 B (di-ethylamine-para-amino-phenyl stibiate) in sublethal doses; their object being to see whether the antimony is deposited or held up in any of the organs and if possible to explain the curative effect of antimony in kala azar. Six animals were employed.

The authors conclude:—

" It does not appear that any particular organ or system has any marked affinity for the antimony. The immediate distribution of antimony would appear to be entirely dependent on physical factors. As we have shown

elsewhere, the main channel of elimination of the antimony compound is through the kidneys. Forty-eight hours after the last dose of a course of injections the bulk of the remaining antimony is found in the liver where it is possibly stored prior to being excreted, but there does not appear to be any general loading of the fixed reticulo-endothelial cells of the body with antimony.

"These experiments do not lend any support to the theory that antimony acts by stimulating the function of the reticulo-endothelial cells yet they in no way disprove this theory, as the reception of a stimulus need not necessarily be accompanied by storage of the stimulating substance, in fact it is more likely that the giving of the stimulus would result in a throwing off of the stimulant; on the other hand they lend definite support to our contention that the action of antimony is an indirect one."

A. G. B.

BASU (N. K.). **Effect of Emetine on Blood-Sugar.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 121–129. With 7 graphs.

Emetine has a marked action on the liver and one of the functions of the liver being carbohydrate metabolism the author determined the amount of sugar in the blood before and after administration of emetine in rabbits and cats "practically starved," to eliminate variations due to diet. The sugar was estimated by the Folin-Wu colorimetric method.

Conclusion.

"(1) Emetine raises the blood-sugar. (2) Emetine stimulates the vagus—as shown by atropine experiments—which is the cause of the rise of the blood-sugar. (3) Emetine does not affect the secretion of the supra-renal glands. (4) Emetine does not seem to affect the glycogenolytic process in the liver or in the muscles. (5) Emetine seems to inhibit the secretion of the islets of Langerhans through the inhibitory fibres of the vagus."

A. G. B.

LEVADITI (C.) & LÉPINE (P.). Etude de 45 éléments du point de vue de leurs propriétés curatives dans les spirilloses, la syphilis et les trypanosomiasis. [**Study of 45 Elements from the Point of View of their Curative Properties in the Spirilloses, Syphilis and Trypanosomiasis.**—*C.R. Acad. Sci.* 1931. Aug. 31. Vol. 193. No. 9. pp. 404–406. With 1 text fig. [2 refs.]

The authors give a figure in which the elements are arranged according to Mendeleeff's periodic law. Those which have been examined by them are indicated on the figure which also shows the active, the moderately active and the inactive elements. Of the 90 known elements 45 were studied. Of these, 10 are endowed with curative properties for the infections named (V, Ga, As, In, Sb, Te, Pt, Au, Hg, Bi). Usually when a derivative of a given element is so endowed, the metal itself in fine division is curative also; exceptions are gold and gallium.

A. G. B.

KERR (A. F. G.). **Poisoning by Pak Wan (*Melientha suavis*) in Siam.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Aug. 8. Vol. 25. No. 2. pp. 141–143. With 1 text fig.

"Pak wan" is the Siamese name for *Melientha suavis* Pierre, a small Opiliaceous tree common in dry deciduous forests. During the dry season

the tree puts out new shoots which are gathered and eaten, usually with impunity. But under conditions at present unknown they give rise to fatal poisoning. Details of a case, seen after death, are given. The symptoms, which seem to develop slowly, are giddiness and faintness, vomiting, and either collapse and death, or recovery with a sore mouth. The vomit is reported sometimes as black. The author suggests that the shoots may be at times infected with a parasite, animal or vegetable, which renders them toxic. The shoots are figured.

A. G. B.

BLACKIE (W. K.). **A Case of Carbon Tetrachloride Poisoning in Southern Rhodesia.**—*Jl. Helminthology*. 1931. July. Vol. 9. No. 3. pp. 129–132. [4 refs.]

The author notes the conditions in which fatal poisoning may follow the oral administration of carbon tetrachloride, viz. alcoholic cirrhosis, alcohol taken immediately after the drug, fat diet, presence of ascarides, deficiency in blood calcium reserve, impurities in the drug. In the present case none of these conditions was present.

An adult native from Nyasaland was admitted to the Salisbury Hospital for a painful swelling of the left lower limb. Hookworms being found, he was treated for them. After a supper of rice and bread and milk, at 7.0 a.m. he received 3 cc. of carbon tetrachloride in capsule, followed by mag. sulph. at 9.0. A stool containing Necators was passed. By midday he was drowsy and lethargic with vertigo; in the evening he vomited. He lapsed into coma and died at 5.0 a.m., 22 hours after the dose. The liver was enlarged and of a pale colour. Microscopically, the lesions presented a distinct zonal distribution in regard to the liver lobule.

"At the periphery of each lobule and in close proximity to the portal tracts a number of liver cells could invariably be found showing only slight degrees of cloudy swelling. Cells situated a short distance in from the periphery and cells of the mid-zonal area showed much vacuolation of their cytoplasm and an indeterminate cell outline while the central cells were so extensively damaged and autolysed as to give the centre of the lobule a loose reticular appearance. In those areas characterised by extensive damage to the parenchyma, the liver sinusoids were intensely congested and showed a tendency to bulge outwards and replace the damaged liver cells thus giving a haemorrhagic appearance to parts of the section."

There were also lesions of the kidneys and lungs. Two other native received a similar dose under similar conditions on the same day without harm.

A. G. B.

SERRA (Américo). **Balantidial Dysentery in Child. Death following Rectal Administration of Oil of Chenopodium. Case Report.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 443–444. [1 ref.] [Ponce Biol. Lab., Ponce, Porto Rico.]

In over 5,000 stool examinations made at the Ponce Laboratory, Porto Rico, *Bal. coli* was seen in only 4 cases and in only one were there symptoms of dysentery.

The case was that of a white female child aet. 6 years of 40 lbs. weight with pallor, weakness, breathlessness and bloody diarrhoea of 6–7 months' duration. Large numbers of *Bal. coli* in stools. Bismuth subcarbonate, emetine hydrochloride and dihydranol having proved ineffective, oil of

chenopodium was administered by CORT's method [this *Bulletin*, Vol. 26, p. 164]. Four grams in 25 cc. olive oil were given rectally. In less than an hour there was vomiting, then dizziness, stertor, convulsions, laboured respiration and, after less than 6 hours, death from respiratory failure. No autopsy.

[One of CORT's 12 cases developed vomiting, dizziness and collapse owing, it was thought, to an overdose.]

A. G. B.

- i. PASRICHA (C. L.), DE MONTE (A. J.) & GUPTA (S. K.). **Seasonal Variations of Cholera Bacteriophage in Natural Waters and in Man, in Calcutta during the Year 1930.**—*Indian Med. Gaz.* 1931. Oct. Vol. 66. No. 10. pp. 543-546. With 2 text figs. [1 ref.]
- ii. —, — & —. **Seasonal Variations of Dysentery Bacteriophages in Natural Waters and in Man, in Calcutta during the Year 1930.**—*Ibid.* pp. 546-549. With 2 text figs.
- iii. —, — & —. **Seasonal Variations of Typhoid Bacteriophage in Natural Waters and in Man, in Calcutta during the Year 1930.**—*Ibid.* pp. 549-550. With 1 text fig. [School of Trop. Med. & Hyg., Calcutta.]

i. Bacteriophage was isolated from water according to the following technique :—

One hundred cc. test water were added to 10 cc. 10 per cent. peptone water; incubated over night, the surface growth plated for isolation of vibrios and the peptone water culture filtered for bacteriophage. The filtrate was incubated with a young bacteriophage-free peptone water culture of a vibrio which was capable of propagating all types of phage. This culture was again filtered and the filtrate tested for phage thus: One cubic centimetre of a 4-hour old peptone water culture of a pure vibrio was added to 10 cc. of papain broth, varying amounts of the filtrate added and the emulsion immediately spread on an agar plate. Samples which showed phage were, after passage with a susceptible vibrio, tested for type.

The technique was similar for the examination of stools. The great majority of the phages were of the quick acting Asheshov-type A. An explanation is put forward for the comparative absence of types B and C in nature as being due either to their death or the want of a sufficiently delicate technique to demonstrate their presence. Thus the original filtrate of a 2nd-day cholera stool with agglutinating vibrios present gave a type A cholera phage which after passage with a susceptible vibrio furnished all three types A, B and C. The original stool however, with and without dilution in broth or tap water, failed after 10 days to furnish any but type A. Points which are brought out in the article are that: (1) "Cholera phages in Nature vary with the incidence of the disease." (2) The heavy monsoon rainfall "checks the activity of cholera." (3) "The mortality rate which is high at the beginning of the cholera season falls rapidly when cholera phages have become widely distributed in Nature." (4) Non-agglutinating vibrios in waters are more frequent at the beginning of the cholera season.

ii. This article proceeds on similar lines. "Dysentery phages can frequently be isolated from individuals not suffering from dysentery." Many of the phages isolated from natural waters and from man were of low virulence and soon died out in the original filtrates. Their virulence could be exalted to a limited extent. A few races of bacteriophage after repeated transfers on susceptible bacteria became virulent and

able to cause "a rapid, complete and permanent lysis of several strains of dysentery organisms." Secondary colonies, developed after the action of phage, were non-agglutinable by high titre sera and although fermenting the same sugars as the parent strain did so "with the production of gas."

iii. Three hundred and eighty-five samples of water and 403 individuals were examined for the presence of typhoid bacteriophage with a 12 per cent. and 10 per cent. success respectively. Four types of phage were obtained. Administration of virulent phages to 5 cases of typhoid fever was followed by improvement in two.

W. F. Harvey.

SENEVET (G.). **Un test pratique en parasitologie clinique. [A Practical Test in Clinical Parasitology.]**—*Bull. Soc. Path. Exot.* 1931. Apr. 15. Vol. 24. No. 4. pp. 284–286. With 1 text fig. [Pasteur Inst. of Algeria & Faculty of Med., Algiers.]

It is not uncommon for the inexperienced worker to mistake some element belonging to the food debris in a stool for a cyst or a helminthic ovum. The mistake is usually due to want of appreciation of the absolute size of the object. The author proposes that lycopodium spores be incorporated with the test faecal matter as a routine procedure so as to provide a measure by which relative size can be immediately appreciated on microscopic examination.

W. F. Harvey.

HENNESSEY (R. S. F.). **Some Remarks on Laboratory Medicine, with Special Reference to Certain Common Investigations.**—*Kenya & East African Med. Jl.* 1931. Oct. Vol. 8. No. 7. pp. 200–207.

The author discusses procedure in the serum agglutination test, the Van den Bergh test and the examination of blood films for malarial parasites. It is, on occasion, necessary to make special test for somatic agglutinins in case the infecting organism be a non-flagellated variant or the individual have already been prophylactically inoculated. His rules for malaria are: (1) Search the thick film until a parasite is seen or for a maximum period of 15 minutes. (2) If parasites average one or more per forty fields, examine the thin film for 15 minutes. (3) If parasites do not average one per forty fields only examine the thin film for signs of blood disease.

W. F. Harvey.

FITZGIBBON (H. E.). **Native Locations in Africa.**—*Jl. Inst. Municipal & County Engineers.* 1931. June 9. Vol. 57. No. 25. pp. 1367–1372.

The author develops the argument that it is fruitless to condemn natives or any other people for filthy conditions and surroundings which it is practically beyond their power to alter. An inspection of native locations is sufficient to show that from a sanitary point of view the principal objection to be found is the neglect of the necessary public services of scavenging, latrine management, etc. The scavenging is usually neglected, and the maintenance of roads and drains altogether ignored. [The author is writing of Africa.] Rats are natural scavengers, but if the scavenging is properly done by an efficient

scavenging service the rats will go elsewhere or die out. Where good maintenance regulations (for huts) are strictly enforced, harbourage of insects will not be much of a problem. Free whitewash or colour wash would not cost Government or Local Authorities very much, and would be welcomed by the natives. It could, perhaps, be made up with some suitable non-poisonous chemical substance inimical to insect life. The author is against the standardized square concrete, corrugated-iron roofed buildings on aesthetic grounds, and because natives will never voluntarily inhabit such buildings.

Roughly finished concrete walls are no easier to cleanse than the surface of mud plaster, while the bare surface of cold stone or cement concrete condenses more moisture from the air than mud or any other plaster. The author suggests :

1. Select site, if possible on rising ground and within one mile of work.
2. Planning of site. [In the selection of a site special attention should be given to the direction of the prevailing wind in relation to anopheline breeding areas.]
3. Grading of roads, etc., and construction of roadside drains.
4. Regulations and type plans for construction and maintenance of houses (including whitewashing), yards and partition fences, and for inspection and dealing with infractions.
5. Organize and maintain sufficient services for scavenging (and conservancy if necessary) and for routine management of roads and drains.
6. Require that an impermeable layer of some suitable material be laid over the site of every building.

H. Home.

QUAIFE (W. T.). **The Brushing Method of Oiling.**—*Malayan Med. Jl.* 1931. June. Vol. 6. No. 2. pp. 62-63. With 1 text fig.

This method is a modification of oiling with a small mop which has been employed for many years.

"Materials : (1) a small mop of shredded coconut fibre on a light stick ; (2) a flat Chinese bamboo broom ; (3) a one gallon pail. The oil used is local Diesel fuel (French, 'Mazout'). The high larvicidal efficiency of the local Diesel fuel in the field has long been established by Hacker, Wellington, myself and doubtless many other observers."

"The Method. Two men are necessary. One takes the oil and the small mop, and having dipped this into the oil, sprinkles the water, walking forward smartly four paces, and then dips again. The other man lightly brushes the oil and water to and fro on to the edges. He brushes not at right angles to the edges, but at a very acute angle, and thus splashes waves of oil and water along the edges of the drain or stream. A fine mixture results and an even continuous film of oil is left on the water. For some time afterwards there is a trickle of oil back from the edges.

"In streams wider than one yard it is necessary to sprinkle both edges, but in narrower waters the centre only is sprinkled. In very narrow drains the brush is drawn vigorously along the drain once without the special brushing movement. The work is light, and the men go along rapidly.

"Quantity used. A film sufficiently thick on a drain half a yard wide is obtained by one dip of the mop to four paces and works out at approximately one gallon of oil to ten chains of drain (one litre to fifty metres). But one gallon to twenty chains of drain half a yard wide (one litre to one hundred metres) gives a good film which is effective as a larvicide. On one estate two men oil by this method 250 acres of flat land containing a larger number of drains than is commonly seen in an oiling area, in six hours' work. The average forty chains radius oiling area in wet weather would be oiled by four men by this method in one working day and this is better for supervision than where one oiler is employed working daily.

"Advantages of the brushing method : (1) Rapidity and lightness of the

work for the labourer ; (2) a cheaper oil is used ; (3) less than half the quantity of oil is used than by spraying with a pump sprayer and little more than half where a pneumatic sprayer is used—on the average, the cost of oiling is halved by this method ; (4) where transport of oil is costly, then this method should be employed.

" *Disadvantages.* The method is not suitable for widely distributed seepages such as occur in some ravines with high clay sides. Grass is not killed in the drains and on the sides by this method. But it is cheaper to scrape the grass by hand labour than to use an expensive oil to kill it."

Recent surveys of an area oiled by this method showed no anopheline larvae in the oiled places.

A. G. B.

HOLT (R. L.). **A New Mosquito Spray.**—*Milit. Surgeon.* 1931. Dec. Vol. 69. No. 6. pp. 625-627.

" Two hundred and forty grams of fresh pyrethrum powder were treated with 408 cc. of carbon disulphide for a period of two hours. At the end of this time the mixture was filtered, the filtrate of approximately 350 cc. being added to enough water-white kerosene to make one gallon of mixture. Using the same quantities, other mixtures were made using acetone and chloroform respectively as solvents."

The preparations made with carbon bisulphide and acetone were efficient but highly toxic and inflammable.

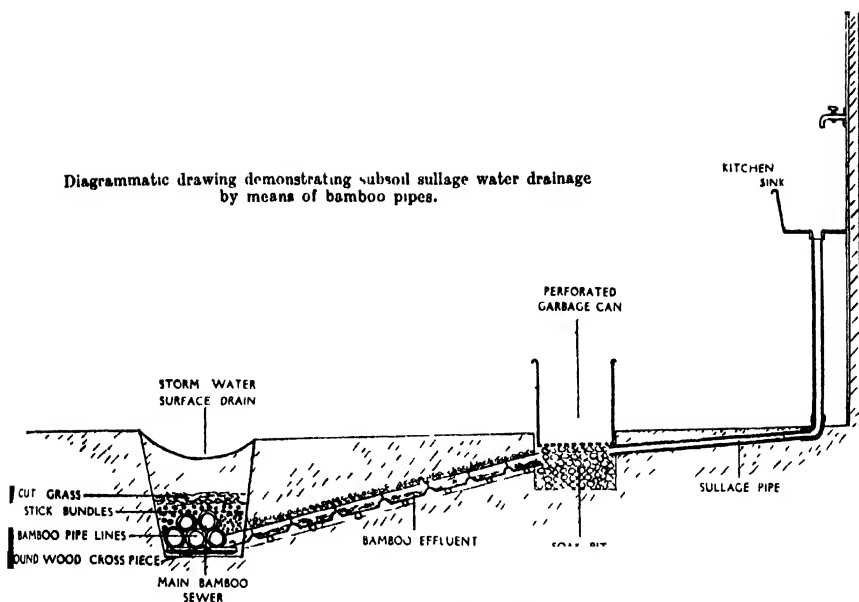
" The chloroform mixture has a very pleasant odor and shows fully as much efficiency as either of the other mixtures. There is no danger from fire. Toxicity to man and animals is absent. The final trial of this preparation was made by spraying one cubic centimeter for each thirty cubic feet of air space in wards of Sternberg General Hospital containing about one hundred thousand cubic feet. The instrument used was a paint spray gun actuated by compressed air and the amount of the spray used for wards of this size was about 350 cc. for each ward. All spraying was done near the ceilings of the wards and the gaseous mixture allowed to settle out. No attempts were made to close the wards in any manner. Ceiling fans were stopped to prevent dissipation. At the end of the spraying process a faint mist of the spray could be seen throughout the ward. Five minutes after spraying had ceased mosquito-net cages, containing a known number of the insects, were taken into the ward and placed on the floor at or about the centre. Calculations of the efficiency of the method were made at the end of thirty minutes in all three cases. It was found that an average of 90 per cent. of all mosquitoes in the cages were killed at the end of this time. The cages were then removed and kept over night to determine if any of the insects recovered. It was found that recovery did not take place. Under the same conditions it was also found that this particular spray was highly efficient in the destruction of cockroaches and flies."

The cost is about one dollar per gallon of mixture.

A. G. B.

JACK (J.). **Use of Bamboo in Subsoil Drainage.**—*Jl. Roy. San. Inst.* 1931. July. Vol. 52. No. 1. pp. 13-18. With 7 figs.

The author describes subsoil drainage in which bamboos were substituted for ordinary drainage pipes in flat and swampy land, the soil clay and extremely impermeable, in a district bordering on the Demerara River. When cut and exposed to the sun and rain bamboo rapidly cracks and decays ; if it is cut green and buried in the soil it will last for years. Green stems of 4 to 6 inches in diameter should be selected, trimmed and cut into lengths of 15 ft. approximately. By means of a series of deep notches, penetrating to one-half the



[Reproduced from *Les Progrès de l'Aluminium VIII*, published by Aluminium Ltd., Geneva]

thickness of the bamboo, the woody septum which divides the hollow stem into sections is exposed, and partly removed, the rest being cut away with a chisel. The growing eye is also removed and we have then a thick, straight pipe, 15 feet long, provided at regular intervals with percolating orifices. For subsoil drainage the bamboo pipes are put end to end in the drains, with the notched side facing downwards. The pipes should not lie on the bottom of the drain, but should be raised with short pieces of hard, round wood, $1\frac{1}{2}$ ins. in diameter, placed across the main axis of the drain, and at regular intervals, in between the notches.

The pipe is thus raised clear of the bottom, free access to the notches being allowed. To prevent earth being washed into the pipe the junctions between lengths of pipes should be covered with short lengths of bamboo split in half. The drains are partly filled with cinders, broken brick, etc., and finally covered with 2 to 4 in. of soil. Sullage water from individual houses is run direct into a small soak-pit, filled with broken brick or other rubble. This acts as a grease-trap and filter. It is surmounted by a garbage can, with fine perforated bottom, sunk into the ground about 6 in., and rests on the rubble. The effluent of the soak-pit is carried by a subsoil bamboo drain, which leads to the main bamboo drain which may be of five or six bamboo lines if necessary. This arrangement is well shown in the figures illustrating the text.

H. Home.

CORFIELD (C. Russell). **Pseudo-Argyll Robertson Pupils as Result of Long Residence in the Tropics.**—*Brit. Med. J.* 1931. July 25. p. 146.

The author records two cases of abnormally contracted pupils with sluggish reaction to light and accommodation in men who had lived ten years in the tropics and returned home after the war. W.R. was negative :

no evidence of malaria ; no morphine addiction. He speculates whether this is due to past malaria or to sun glare and exposure of neck to sun.

A. G. B.

GOTHOSKAR (S. B.). **Infantile Biliary Cirrhosis and Artificial Feeding of Infants in India.**—*Indian Med. Gaz.* 1931. June. Vol. 66. No. 6. pp. 304-306.

The author attributes this condition to the Indian practice of removing the cream from cow's milk which is then diluted, i.e., to starvation in fats and sugar.

A. G. B.

BONNIN (Henri). Les indications thermales dans les maladies tropicales.—*Gaz. hebdom. Sci. Méd. de Bordeaux.* 1931. Oct. 4. Vol. 52. No. 40. pp. 630-637. [3 refs.]

BULLETIN DE L'ACADÉMIE DE MÉDECINE. 1931. Dec. 1. 95th Year. 3rd Ser. Vol. 106. No. 38. pp. 495-507.—Colonies. Fonctionnement du service vaccinal pendant l'année 1929.

CAWSTON (F. G.). Native Medical Treatment in South Africa.—*Jl. Trop. Med. & Hyg.* 1931. Nov. 16. Vol. 34. No. 22. pp. 378-380. With 1 text fig. [1 ref.]

KECHT (Bruno). Zur Frage der Pathogenität von *Lamblia intestinalis*.—*Wien. Klin. Woch.* 1931. Nov. 27. Vol. 44. No. 48. pp. 1500-1502. With 1 text fig. [2 refs.] [III. Med. Clinic, Univ., Vienna.]

SOERONO (M.). A Simple Method for staining Bloodfilms on a Large Scale.—*Meded. Dienst d. Volksgezondheid in Nederl-Indië.* 1931. Vol. 20. Pt. 2. pp. 122-123. With 2 text figs.

We regret to have to record the death on Easter Day, March 27, of Colonel J. H. TULL WALSH, I.M.S. (ret.). Colonel Tull Walsh was a Sectional Editor from 1916 to the date of his death.

TROPICAL DISEASES BULLETIN.

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1932.

[No. 5.]

TROPICAL MEDICAL MYCOLOGY:

A REVIEW OF RECENT ARTICLES.

Dermatophytoses. KUROTCHKIN and CH'IN¹ in 118 cases of tinea of the glabrous skin in Peking found onychomycosis present in 18 cases. There were two clinical types: (a) the commonest form, characterized by great thickness and brittleness of the nails which were also ridged or otherwise deformed; and (b) a form in which the nails remained smooth and had an abnormally dull white colour characteristic of leuconychia. Of the 18 cases 13 showed fungi microscopically and by culture, and the remaining cases in which fungi were not found were of long duration. The fungi found were: *Epidermophyton rubrum*, 9 cases; *E. inguinale*, 1; and *Trichophyton pedis a*, 3. The disease is generally a secondary infection from lesions pre-existing on the hands or other region, is of very long duration and rarely responds to any treatment.

KUROTCHKIN and CHEN² studied 100 cases of tinea of the glabrous skin in Peking, and obtained the following results: From 28 cases of tinea cruris 25 cultures were obtained, including 18 of *Epidermophyton rubrum*; 3 of *Trichophyton pedis a*; and 4 of *T. pedis b*. Among 14 cases of tinea of the hands, 9 showed fungi microscopically and by culture, the cultures isolated being *E. rubrum*, 5 cases; *T. pedis a*, 2; *T. pedis b*, 2; and unidentified species, 1. There were 36 cases of tinea of the feet, of which 26 gave positive cultures, including *E. rubrum*, 5; *E. inguinale*, 6; *T. pedis a* and *T. pedis b*, 8 each. Cultures were positive in all of 16 cases of tinea of the body, the fungi found being: *E. rubrum*, 3 cases; *T. pedis a*, 3; *T. pedis b*, 1; *Microsporum ferrugineum*, 4; *Trichophyton violaceum*, 4; and unidentified, 1. Six cases of the disease known as Pompholyx were met with, but no causal organism was found microscopically or by culture and the authors consider that probably the lesions are "epidermophytids" analogous to trichophytids. From these results they conclude that

¹ KUROTCHKIN (T. J.) & CH'IN (T. L.). Tinea of Nails in Peiping.—*Nat. Med. J. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 534-540. With 7 figs. on 6 plates. [6 refs.] [Peiping Union Med. College, Peking.]

² KUROTCHKIN (T. J.) & CHEN (F. K.). Mycological Study of Tinea of the Glabrous Skin.—*Nat. Med. J. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 521-528. With 12 figs. (11 on 6 plates). [11 refs.] [Peiping Union Med. College, Peking.]

E. rubrum is the main cause of tinea of the glabrous skin, and is found in all regions, but is most common in the crural area. Tinea cruris may also be caused by *Trichophyton pedis a* and *b*, but they think that these are only varieties of *E. rubrum*. Although *E. inguinale* is the sole cause of tinea cruris in Europe, it was never found in that condition in Peking where it is common in tinea of the feet.

CHEN, KUROTCHKIN, and HU³ found 18 cases of favus among 410 cases of tinea of the scalp in orphanages in Peking. In most cases the classical clinical appearance was seen, but some cases resembled trichophytosis or folliculitis decalvans. The fungus isolated is considered to be a new variety of *Achorion schönleinii*. Inoculation of guinea-pigs and white mice with scutula was negative, but with cultures inoculation was positive in 50 per cent. of the animals.

NEGRONI⁴ in Buenos Aires in 157 cases of mycoses found the following fungi: *Achorion gypseum*, 2; *A. schönleinii*, 5; species of *Cryptococcus*, 21; *Epidermophyton inguinale*, 8; *E. interdigitale*, 3; *E. rubrum*, 1; *Microsporum felineum*, 26 cases in hair, 13 on glabrous skin and 4 in cats; *M. lanosum*, 5; *Trichophyton acuminatum*, 2; *T. album*, 3; *T. asteroides*, 5; *T. cerebriforme*, 1; *T. depressum*, 1; *T. granulosum*, 2; *T. ochraceum*, 2; *T. plicatile*, 2; *T. radiolatum*, 5; *T. rosaceum*, 2; *T. sulphureum*, 1; *T. violaceum*, 6; undetermined Trichophytons, 4; *Malassezia furfur*, 4; Thrush, 1 case; actinomycoses 8 cases, 2 due to *Actinomyces asteroides*, 1 to *A. maduræ* and 5 to undetermined species; *Sporotrichum beurmanni*, 1; American blastomycosis, 2 cases; *Aspergillus fumigatus*, 1; epidermomycoses, 6 cases; onychomycoses, with negative cultures, 3 cases; and *Cryptococcus* sp. in 26 cases of intertrigo. The author notes that the cases of favus were all in immigrants or their children; all cases of *T. violaceum* were in Jews; and that *M. felineum* is the commonest dermatophyte in Buenos Aires.

In other papers^{5 & 6} NEGRONI describes a fungus isolated from nail scrapings from patients with onychomycosis and epidermomycosis. According to THOM the fungus is a species of *Cephalosporium*. Guinea-pig inoculation was negative. NEGRONI attributes a pathogenic rôle to the *Cryptococcus* which, as mentioned above, was isolated from 26 cases of intertrigo. No other fungus was present in the lesions and the same type of culture was given by many different scrapings.

TALICE and MACKINNON⁷ in Uruguay from 70 cases of dermatomycoses, mostly from Montevideo, got 23 cultures of *Sabouraudites*, including 2 of *S. gypseus* (Bodin 1907); 1 of *S. equinus* (Bodin 1896); 20 of *S. felineus* (Fox and Blaxall 1896). They consider that *S. felineus* and *S. lanosus* are two strains of the same species; and point out that all the species of *Sabouraudites* are of the animal type, a character which seems to be true of all the néo-tropical zone.

³ CHEN (F. K.), KUROTCHKIN (T. J.) & HU (C. K.). Tinea favosa in Peiping.—*Nat. Med. J. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 529-533. With 7 figs. (6 on 4 plates). [15 refs.] [Peiping Union Med. College, Peking.]

⁴ NEGRONI (P.). Statistique de 157 cas de mycose étudiés à Buenos Aires.—*C.R. Soc. Biol.* 1931. Oct. 12. Vol. 108. No. 27. pp. 137-138.

⁵ NEGRONI (P.). Nouvelle Mucédinée parasite de l'homme.—*C.R. Soc. Biol.* 1931. Feb. 13 Vol. 106. No. 5. pp. 386-388.

⁶ NEGRONI (P.). *Cryptococcus* sp. isolés de certaines épidermomycoses.—*C.R. Soc. Biol.* 1931. Feb. 13. Vol. 106. No. 5. pp. 389-390.

⁷ TALICE (R. V.) & MACKINNON (J. E.). *Sabouraudites* (*Microsporum*) parasites de l'homme en Uruguay.—*C.R. Soc. Biol.* 1931. June 30. Vol. 107. No. 21. pp. 883-884. [Hyg. Inst., Montevideo.]

TALICE and MACKINNON⁸ in Uruguay also found 20 cases of trichophytosis among 80 cases of dermatomycoses. The species present were : 4 small-spored, *Ctenomyces mentagrophytes* (Ch. Robin) ; 3 pure endothrix, 2 *Trichophyton sabouraudi* (R. Blanchard 1895), 1 *T. violaceum* (Bodin 1902) ; 2 néo-endothrix, both *Trichophyton flavum* (Bodin 1902) ; 7 large-spored, 3 *T. album* (Sab. 1909), 1 *T. felineum* (R. Blanchard 1895), 3 not cultivated ; 2 cases of favus due to *Trichophyton schönleinii* (Lebert 1845) ; 1 *T. ferrugineum* (Ota 1922) ; and 1 *T. rubrum* (Castellani 1909). It is noticeable that, as in the case of species of Sabouraudites, the species of *Trichophyton* belong mostly to the group of animal origin.

CATANEI⁹ examined 1,504 children in the Oran region of Algeria and found 46 cases of tinea of the hair, but no tinea of the nails or the glabrous skin. The fungi present were : *Trichophyton violaceum*, 12 ; *T. acuminatum*, 3 ; *T. crateriforme*, 1 ; *T. glabrum*, 12 ; *Microsporum audouinii*, 1. The record of *M. audouinii* is the second case in Algeria. Seventeen cases of favus were apparently due to *Achorion schönleinii*. Tinea is commonest between the ages 6 to 10 years and amongst Europeans is most frequent in girls and amongst natives it is probably most common in boys.

AGOSTINI¹⁰ describes a new species of *Bodinia* from the head of a man in Eritrea which he names *B. abissinica*. Inoculation of laboratory animals was negative.

In Peru ESCOMEL¹¹ investigated various chromatic dermatomycoses and came to the following conclusions : In Peru any patch on the skin is commonly called Kcara, Mancha or Pinta. Scientifically these diseases fall into three groups : (a) mycotic kcara, which may be mono- or bi-chromic and occurs in the valleys of the coast ; (b) mycotic kcara which is polychromatic and may be blackish, bluish, red or yellow, and occurs in the tropical forests of S. Peru ; and (c) great kcara, or vitiligo, which is achromatic and is not of mycotic origin. The latter may affect the entire skin to such an extent as to alter the racial appearance of the patient and a Negro or Indian may appear white with a characteristic artificial white tint. It is not rare in newly born infants and is not inoculable from man to man. Spontaneous cure is very rare and treatment to be effective must be commenced very early. It appears to be a disease of alimentary origin among large eaters of maize ; and is common in the tropical forests. The treatment of kcara consists in desquamation with acetic acid or dilute trichloroacetic acid, followed by application of iodine or mercury, together with internal treatment with organotherapy, especially suprarenal, and arsenical therapy.

⁸ TALICE (R. V.) & MACKINNON (J. E.). *Trichophyton* parasites de l'homme en Uruguay.—*C.R. Soc. Biol.* 1931. Sept. 18. Vol. 107. No. 26. pp. 1549–1550. [Hyg. Inst., Montevideo.]

⁹ CATANEI (A.). Recherches sur les teignes dans la région d'Oran (Algérie). Deuxième observation algérienne de microsporidie due à *M. audouinii*.—*Bull. Soc. Path. Exot.* 1931. Mar. 11. Vol. 24. No. 3. pp. 177–181. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

¹⁰ AGOSTINI (A.). *Bodinia abissinica* n. sp. provoquant la teigne de l'homme en Erythrée.—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1931. Mar. Vol. 3. No. 3. pp. 76–77. [Botanic Inst., & Cryptogamic Lab., Univ., Pavia.]

¹¹ ESCOMEL (E.). A propos des kcara, pinta ou caratés dans le Sud du Pérou.—*Bull. Soc. Path. Exot.* 1931. Mar. 11. Vol. 24. No. 3. pp. 215–222.

THONNARD-NEUMANN, MOYA and BREWSTER¹² examined 75 cases of pinta or carate in Colombia and conclude that it is not of fungus origin, but is essentially of endogenous origin and must be closely related to a spirochaetal disease.

According to DA FONSECA and DA ROSA¹³ there have now been 26 cases of keratomycoses nigricans of the palms described in Brazil. They consider that the causal fungus differs from that found in the Orient sufficiently to form the new species *Cladosporium wernecki*; and also consider that the disease produced is different from that described by MANSON in China in 1872 and by CASTELLANI in India in 1905.

Among general papers on ringworm fungi the following are of interest from the medical point of view.

CATANEI¹⁴ describes a pleomorphic form of a culture of *Trichophyton acuminatum* isolated in Algeria. It was constant through animal passage and when inoculated to guineapigs it produced more benign lesions of shorter duration than were caused by the normal cultures. In another paper¹⁵ CATANEI brings together the results of his inoculation experiments on monkeys (*Macacus inuus*) with a number of ringworm fungi. With the ectothrix forms, *Trichophyton violaceum* and *T. sulphureum*, he obtained experimental lesions of several months' duration resembling those found in tinea of childhood, the infected hairs being very similar to infected human hairs. The small-spored ectothrix *T. radiolatum* caused tinea in monkeys of at least 4 months' duration with characteristic lesions of the ectothrix type. The large-spored ectothrix species *T. album* gave lesions and parasitized hairs characteristic of this type. *Achorion schönleinii* caused lesions of very long duration characterized by "favus cups" and parasitized hairs such as are found in man. Inoculation of monkeys with *T. glabrum* and *Microsporum audouinii* failed. Inoculation with *T. radiolatum* following positive inoculation with *T. violaceum* was positive but the resulting lesions were of less severity and of shorter duration than normal.

OTA¹⁶ discusses the synonymy of Epidermophyton and shows that while this name is generally attributed to LANG the term he introduced was *Epidermidophyton*; and then SABOURAUD in 1909 introduced the name *Epidermophyton inguinale*. Actually this fungus should be called *Blastotrichum flucosum* (Harz 1871) but OTA does not advise this owing to the great confusion at present existing in the genus. For example, OTA considers that the six new species described by

¹² THONNARD-NEUMANN (E.), MOYA (J. Camacho) & BREWSTER (K. C.). Is Carate (Pinta) a Dermatormycosis? Clinical Observations in 75 Cases of Carate in Colombia.—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 101-106. With 2 text figs. [United Fruit Company Hosp., Santa Marta, Colombia.]

¹³ DA FONSECA (O.) & DA ROSA (A. Ferreira). Sur *Cladosporium Wernecki* et la k ratomycose nigricans palmaire.—*C.R. Soc. Biol.* 1930. Dec. 19. Vol. 105. No. 35. pp. 785-786. [Oswaldo Cruz Inst., Rio de Janeiro.]

¹⁴ CATANEI (A.). Alt ration pl omorphique d'une culture de *Trichophyton acuminatum*.—*C.R. Soc. Biol.* 1931. Feb. 13. Vol. 106. No. 5. pp. 343-344. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

¹⁵ CATANEI (A.). Les teignes exp rimentales du singe.—*Arch. Inst. Pasteur d'Alg rie.* 1931. Mar. Vol. 9. No. 1. pp. 1-12. With 2 figs. on 1 plate. [2 refs.] [Pasteur Inst. of Algeria, Algiers.]

¹⁶ OTA (M.). Epidermophyton-Epidermidophyton.—*Ann. Parasit. Humaine et Compar e.* 1931. May 1. Vol. 9. No. 3. pp. 277-281. With 1 text fig. [12 refs.] [Dermat. Clinic, Tohoku Univ., Sendai, Japan.]

MACCARTHY in 1925 are synonyms of previously described fungi belonging to several different genera.

MCCREA¹⁷ found that with *Trichophyton interdigitale* repeated injections of living cultures into guineapigs did not produce any immunity to subsequent inoculation; and also that injection of various extracts of cultures of this fungus and *Epidermophyton rubrum* failed to produce immunity. Both fungi are readily inoculable to guineapigs causing lesions which appear in about a week and tend to heal spontaneously in about 4 weeks. Reinfection of the same area with *T. interdigitale* was positive three times in succession.

TRUFFI¹⁸ in experimental mycoses found that when an emulsion of spores of *Achorion quinckeanum* or *Trichophyton gypsum* is injected endocardially a mycotic lesion is always produced at the site of a cutaneous traumatism. The application of chloroform to the skin also induces the formation of a cutaneous lesion at the point of application. In this type of infection (haematic) the hair follicle is the point of fixation of the fungus which later invades the superficial corneous cells and causes typical ringworm lesions. The essential condition for cutaneous lesions to develop after endocardial inoculation is the presence of cutaneous traumatisms or alterations in the walls of the vessels; and it is not due to tropism or chemotaxis. Mycosis of the internal organs could not be induced although most of the tissues of inoculated animals gave abundant growths of the fungus when removed from the animal.

OTA and KAWATSURÉ¹⁹ investigated the inoculability and immunology of *Endodermophyton* in guineapigs. They found that in morphological characters *Endodermophyton tropicale* Cast. and *E. indicum* Cast. are very similar; and a strain isolated by MIYABARA in Formosa appears to be the same species. Consequently the authors unite these species as *E. concentricum* (R. Blanchard 1895) Cast. 1914. *E. raquettei* da Fonseca 1925 is very similar to them also, but is more vigorous and more virulent and, as it was cultivated from a different disease from tinea imbricata it is regarded as a separate species. They found that *E. concentricum* (Miyabara strain) and *E. raquettei* are easily inoculable to man and the experimental infection tends to spontaneous cure. Positive experimental infection with *Endodermophyton* seems to prevent later infection with the same or different strains of *Endodermophyton*, and even infection by a more virulent fungus such as *Sabouraudites asteroides*. In experimental infections *endodermophytine* gives a positive intradermal reaction. They also succeeded in infecting guineapigs experimentally with three strains and in the lesions hairs were invaded in addition to the epidermis. The different strains invaded the hairs in different manners but the differences are regarded as being only accidental phases of growth

¹⁷ MCCREA (Adelia). Parasitic Fungi of the Skin.—*Jl. Trop. Med. & Hyg.* 1931. July 15. Vol. 34. No. 14. pp. 204–206. [1 ref.] [Research & Biol. Labs., Parke, Davis & Co., Detroit.]

¹⁸ TRUFFI (Giovanni). Contributo ai problemi delle dermatomicosi sperimentali.—*Boll. Istituto Sieroterap. Milanese.* 1931 Jan. Vol. 10. No. 1. pp. 11–28. With 10 figs. (1 coloured) on 4 plates. [63 refs.] French summary.

¹⁹ OTA (M.) & KAWATSURÉ (Sh.). Inoculabilité au cobaye et immunologie des champignons parasites du genre *Endodermophyton* Castellani.—*Ann. Parasit. Humaine et Comparée.* 1931. Mar. 1. Vol. 9. No. 2. pp. 144–161. With 1 text fig. & 8 figs. on 2 plates. [10 refs.] [Dermat. Clinic, Imperial Univ., Tohoku, Sendai, Japan.]

in the same species of fungus. *E. indicum* Cast. did not infect guineapigs.

LÜCKE²⁰ working with animal ringworms found that under similar conditions Grütz's medium is as good as Sabouraud's and permits the differentiation of species according to Sabouraud's method. Experimental inoculation of guineapigs with animal dermatophytes nearly always succeeds, the best method being that of BLOCK which is cutaneous inoculation by means of scarification with sandpaper. After recovery from experimental infections guineapigs acquire a conditional immunity. Experimentally infected guineapigs have a complement fixing immune substance of some specificity in the blood. In spontaneous infections of tinea tonsurans in cattle and horses the complement fixation reaction is positive, but it is not specific, and the strength of the reaction has no parallelism with the severity of the disease. The "Hoechst" trichophytine is of no use in the diagnosis of animal dermatomycoses. The author could find no microscopical or cultural confirmation of FAWBACH's work in which the agent of *Trichorhexis nodosa* of animals is said to be *Trichophyton equinum*.

In view of the very great increase recently in the incidence of Epidermophytoses of the feet, and the risk of reinfection from slippers, socks and so on, AYRES, ANDERSON and YOUNGBLOOD²¹ tried the effect of exposing various fungi to fumigation with a formaldehyde candle. Infective material from lesions and dried material from old cultures of the fungi *Epidermophyton* sp., *Microsporum lanosum* and *Monilia albicans* were killed by 4 hours' exposure to the fumes in a moist room.

CORNBLEET²² recommends the following reagent as superior to KOH for revealing fungous elements in hairs and scrapings. Preparation: Mix equal quantities of sodium sulphite crystals and 95 per cent. alcohol. The white precipitate which results is redissolved by the addition of distilled water drop by drop until the solution is clear. It is then ready for use. Preferably hairs and scales should be soaked first in ether to remove surface oil, and then mounted in a drop of the reagent.

DOWLING²³ in a review of recent work on the dermatophytes pays special attention to immunity and the mechanism of infection; and also gives an account of his work in transmitting *Trichophyton asteroides* to monkeys and guineapigs (previously summarized in this *Bulletin*, Vol. 28, p. 425).

²⁰ LÜCKE (R.). Beiträge zum Studium der tierischen Dermatomykosen unterbesonderer Berücksichtigung der Immunitätsfrage.—Reprinted from *Ztschr. f. Veterinärkunde*. 1930. Vol. 42. No. 6. p. 193 in *Arb. a. d. Reichsgesundtsamt*. 1931. Vol. 62. No. 4. pp. 573–591. With 3 text figs. [22 refs.]

²¹ AYRES (Samuel), Jr., ANDERSON (Nelson Paul) & YOUNGBLOOD (Esther M.). Fumigation as an Aid in the Control of Superficial Fungus Infections.—*Arch. Dermat. & Syph.* 1931. Aug. Vol. 24. No. 2. pp. 283–287. With 2 text figs. [2 refs.]

²² CORNBLEET (Theodore). A Reagent for demonstrating Fungi in Skin Scrapings and Hair.—*Jl. Amer. Med. Assoc.* 1930. Dec. 6. Vol. 95. No. 23. pp. 1743–1744. With 4 text figs. [Med. College, Univ. of Illinois, Chicago.]

²³ DOWLING (G. B.). Recent Studies of the Dermatophytes, including a Report of Experimental Inoculations of Monkeys (*Macaque rhesus*) and Guinea Pigs with Two Dermatophytes and One Blastomycoides.—*U.S. Nav. Med. Bull.* 1931. Jan. Vol. 29. No. 1. pp. 48–67. [56 refs.]

Moniliasis. BALOZET²⁴ describes two cases of bronchial moniliasis at Casablanca which are the first recorded in Morocco. The first case was in a male patient aged 28 and simulated tuberculosis but no Koch bacilli were found in the sputum in which yeast cells were numerous. Cultures of *Monilia tropicalis* Castellani 1916 were isolated from the sputum and this fungus seems to have been the principal pathogenic agent. The second case was in a male aged 54 and involved the left lung base. The sputum contained no Koch bacilli but yeast cells and mycelium were present and cultures of *Monilia bronchialis* Cast. 1910 were obtained. In this case the fungus was apparently a secondary infection.

STONE and GARROD²⁵ undertook serological tests of a number of strains of monilia from various pathological conditions. All strains of monilia from cases of thrush gave identical reactions. Of 14 strains, 12 gave reactions identical with those of *Monilia albicans* of thrush; and of 10 named types of monilias of Castellani, 6 gave reactions identical with *M. albicans*. The serological tests employed were complement fixation and precipitin reaction. For the latter sera were prepared by intravenous injections into rabbits of 5 doses at 5 days' interval of killed saline suspensions of monilia cells from cultures on Sabouraud's agar, the doses increasing from an opacity equivalent of 500 millions to 10,000 millions. The rabbits were bled 10 days after the last injection. Extracts were prepared by emulsifying a Sabouraud's agar slope of growth in 10 cc. of saline, autoclaving for 30 minutes at 15 pounds pressure, and then centrifuging. The supernatant fluid contained abundance of precipitinogen.

SHAW²⁶ found that different species of *Monilia* may show morphological differences in the character of growth on dextrose agar, the microscopical appearance of stained slides from these cultures, and in the character of the growth in gelatin stab cultures.

ZEPPONI²⁷ confirmed CASTELLANI'S work that the species *Monilia tropicalis*., *M. macedoniensis* and *M. krusei* are very similar in morphology but differ in their biochemical reactions.

REIMANN and KUROCHKIN²⁸ attempted to produce pulmonary moniliasis in monkeys (*Macacus sinensis*) with cultures of *Monilia tropicalis* isolated from a fatal case of bronchomoniliasis. Infections were made intratracheally, intravenously and directly into the lungs with and without previous or simultaneous injury to the lungs by injection of charcoal, powdered glass, injection of chaulmoogra oil intravenously or direct laceration of the lung tissue. In no case did an infection with *Monilia* result.

²⁴ BALOZET (L.). Deux cas de moniliase bronchique.—*Bull. Soc. Path. Exot.* 1931. Jan. 14. Vol. 24. No. 1. pp. 15-17.

²⁵ STONE (Kenneth) & GARROD (L. P.). The Classification of Monilias by Serological Methods.—*Jl. Path. & Bact.* 1931. July. Vol. 34. No. 4. pp. 429-436. [13 refs.] [St. Bartholomew's Hosp., London.]

²⁶ SHAW (Frederick W.). A Morphological Study of the Genus *Monilia*.—*Zent. f. Bakt. I. Abt. Orig.* 1931. Feb. 3. Vol. 119. No. 7/8. pp. 460-464. With 12 figs. on 1 plate. [11 refs.]

²⁷ ZEPPONI (G.). Some Observations on Certain Species of *Monilia*.—*Jl. Trop. Med. & Hyg.* 1931. May 1. 3 pp. With 3 figs. on 1 plate. [13 refs.] [Ross Inst., & Hosp. for Trop. Diseases, London.]

²⁸ REIMANN (Hobart A.) & KUROCHKIN (Timothy J.). Attempts to produce Bronchomoniliasis in Monkeys.—*Amer. Jl. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 151-155. [3 refs.] [Peiping Union Med. College, Peking.]

LIM, KUROCHKIN and Wu²⁹ investigated experimental bronchomoniliasis in rabbits. They found that intratracheal inoculation of rabbits with cultures of various ages, with or without equal amounts of powdered glass or charcoal, did not produce infection. Similar inoculation of rabbits, the lungs of which were previously injured by the injection of powdered glass, animal charcoal or 2 per cent. phenol failed to produce infection. Inoculation following the production of small embolic lesions in the lungs by intravenous injection of liquid paraffin also gave negative results. When stable lesions of the lungs were produced by intravenous injection of chaulmoogra oil, inoculation with *Monilia* cultures resulted in localized or generalized monilia infections in 13 out of the 23 animals inoculated. The authors consider that this suggests that "primary bronchomoniliasis" in man is dependent on pre-existing active pathological changes in the lungs.

Splenomegaly. The question as to the mycotic origin of splenomegaly was investigated experimentally by REIMANN and KUROCHKIN³⁰. They conclude that siderotic nodules in the spleen are not characteristic of primary splenomegaly as they may be found in other tissues and in other diseases and in some cases may be absent from chronic splenomegaly spleens. The siderotic nodules are not due to the presence of fungi since fungi were cultivated from spleen with no nodules, and in some cases were not cultivated from spleens with numerous nodules; the siderotic nodules have been experimentally produced by the injection of alcohol; and, finally, the filamentous structures found in such nodules are not hyphae of fungi but are degenerated tissue fibres. They sum up the evidence against the mycotic origin of splenomegaly by the statements: different workers have isolated different kinds of fungi; the disease can not be experimentally reproduced in monkeys; and it has not been proved that the fungi isolated were not air borne contaminations.

LABBÉ, BOULIN, BESANÇON and PETRESCO³¹ describe a case of splenomegaly in a woman aged 48 in which siderotic nodules, surrounded by haemorrhagic zones, were present. They describe fungal structures in the nodules, but as apparently cultivation was not attempted, there is not sufficient evidence for regarding the disease as being due to a fungus.

Rhinosporidiosis. WELLER and RIKER³² describe the third case of *Rhinosporidium seeberi* in the United States of America. The patient was a man aged 26 years. The structure of the parasite was found to agree with that described by ASHWORTH in 1922. They point out that 40 or more cases have now been reported from various parts of the world,

²⁹ LIM (C. E.), KUROCHKIN (T. J.) & WU (C. J.). Experimental Bronchomoniliasis in Rabbits.—*Nat. Med. J. China*. 1930. Oct. Vol. 16. No. 5. pp. 537-544. With 2 figs. on 1 plate. [3 refs.] [Peiping Union Med. College, Peking.]

³⁰ REIMANN (Hobart A.) & KUROCHKIN (Timothy J.). The Relationship of Fungi to Chronic Splenomegaly of Unknown Origin.—*Amer. J. Med. Sci.* 1931. Jan. Vol. 181. No. 1. pp. 107-114. [15 refs.] [Peiping Union Med. College, Peking.]

³¹ LABBÉ (Marcel), BOULIN, BESANÇON (J.) & PETRESCO. Un cas de splénomégalié mycosique.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1931. May 4. Year 47. 3rd Ser. No. 14. pp. 659-662. [1 ref.]

³² WELLER (Carl Vernon) & RIKER (Aaron D.). *Rhinosporidium seeberi*: Pathological Histology and Report of the Third Case from the United States.—*Amer. J. Path.* 1930. Nov. Vol. 6. No. 6. pp. 721-731. With 13 figs. on 6 plates. [19 refs.] [Path. Dept., Univ. of Michigan, Ann Arbor, Mich.]

3 in U.S.A., 3 from Argentine, and most of the remainder from Southern and Western India and Ceylon, and that in all cases the organism seems to be the one species, *R. seeberi*. All these cases have been in males ranging from 10 to 60 years of age; and the locations include the anal region, conjunctiva and lacrymal sac, uvula and penis. All animal inoculations have been negative and the mode of infection is unknown although autoinfection clearly takes place.

KURUP³³ described the first case of rhinosporidiosis in a woman. The patient was a Mohammedan and the condition was of 8 years' duration. It consisted of a pharyngeal tumour arising from the nasopharynx. In the same paper a case of rhinosporidiosis occurring as a growth on the eyelid of a boy aged 12 is described.

Mycetoma. DELAMARE and GATTI³⁴ briefly describe a case of black-grained mycetoma of the foot of six years' duration. Cultures of a hyphomycete were easily obtained and will be described by the authors in another paper.

CATANEI and LEGROUX³⁵ published the second case of mycetoma of the lung in Algeria. The patient was a European woman aged 36. The first tumour appeared on the posterior arc of the ninth rib and was followed by five more over a period of several months. In spite of local and general treatment the disease continued to extend. Small greyish-white, soft grains, without clubs, were present, and from them *Cohnistrepthrix israeli* (Kruse 1896) was isolated. Inoculation of guineapigs and rabbits with cultures in various ways was negative. Inoculation into the gum of a monkey resulted in a tumour which was resorbed in 3 weeks. Subcutaneous inoculation of a mouse gave a local abscess.

A case of actinomycosis of the jaw in Algeria is described by MONTPELLIER, CATANEI and LEFRANC³⁶. Yellowish-white grains were present from which cultures of *Cohnistrepthrix israeli* were isolated. Potassium iodide in progressive doses of 2 to 8 grams a day for a month resulted in definite improvement.

The same fungus *C. israeli* was found in two cases of actinomycosis in Greece by JOANNIDES, PAPAGHEORGHIU and ANGELO³⁷. These authors consider that this fungus is the sole cause of human actinomycosis.

BREITLÄNDER³⁸ describes the first four cases of actinomycosis in

³³ KURUP (P. K.). *Rhinosporidium kincalyi* Infection.—*Indian Med. Gaz.* 1931. May. Vol. 66. No. 5. pp. 239-241. With 4 text figs. [1 ref.]

³⁴ DELAMARE (G.) & GATTI (C.). Mycétome du pied à grains noirs.—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 80-84. With 3 text figs. [Med. Clinic, Faculty of Med., Asuncion.]

³⁵ CATANEI (A.) & LEGROUX (Ch.). Etude d'un cas d'actinomycose pleuropulmonaire observé en Algérie.—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 85-88. [3 refs.] [Pasteur Inst. of Algeria, Algiers.]

³⁶ MONTPELLIER (J.), CATANEI (A.) & LEFRANC. Un nouveau cas d'actinomycose de la face observé à Alger.—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 431-432. [2 refs.] [Lab. of Path. Anat. Faculty of Med. & Pasteur Inst. of Algeria, Algiers.]

³⁷ JOANNIDES (G.), PAPAGHEORGHIU (S.) & ANGELO (A.). Chronique de l'actinomycose en Grèce.—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 432-433. [6 refs.] [Red Cross Hosp. & Hellenic Pasteur Inst., Athens.]

³⁸ BREITLÄNDER (K.). Aktinomykose in Südchina.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. May. Vol. 35. No. 5. pp. 273-278. With 4 text figs. [Canton Sanatorium, Canton, China.]

China, 3 in Chinese and 1 in an Indian. The first case involved the thigh, and was cured by large doses of KI. The second occurred as an abdominal abscess following an operation for appendicitis, and was cured by KI and deep Röntgen rays; and the same treatment was effective in the third case which involved the maxilla. The fourth case involved the lung and breast and treatment with iodide, small doses of neo-salvarsan and Röntgen rays gave a temporary improvement followed by relapse.

In Rio de Janeiro DA FONSECA³⁹ isolated *Aspergillus amstelodami* (Mangin) from a true case of mycetoma of the foot. The paper contains a detailed description of the fungus; and a lengthy discussion of the classification of the *glaucus* group of the Aspergilli. The grains from which the cultures were obtained were roundish, hard, covered with small protuberances, sulphur coloured and had a maximum size of 1 to 1.5 microns in diameter.

Coccidioides. DA FONSECA⁴⁰ in a general review on *Coccidioides immitis* describes, following an historical account, the morphology and spore formation of the parasite, the cultures, and the results of animal inoculation. He concludes that the visceral lymphatic form of the disease is not uncommon in Brazil. As regards the serological reactions, the agglutination test is negative. Complement fixation is said to be positive by some workers, to be negative by others, and to be a group reaction by still others. The intradermal reaction is positive. Only about six cases of recovery from the disease are known.

Parr Tate.

MAZZA (Salvador) & DE LOS RIOS (Miguel). Sobre un caso de moniliasis vaginal.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 215-225. With 13 text figs. & 1 coloured plate. [4 refs.]

MAZZA (Salvador), NIÑO (Flavio L.), QUINTANA (Hector) & BERNASCONI (Vicente). Blastomycosis grave generalizada por *Monilia* n. sp.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 180-214. With 38 figs., 1 chart & 5 plates (3 coloured). [4 refs.]

NIÑO (Flavio L.). Onicomycosis generalizada de origen penicillar.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 27-34. With 8 figs. & 1 plate.

NIÑO (Flavio L.). Consideraciones diagnósticas acerca de la propagación al aparato respiratorio de la blastomycosis de Gilchrist.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 168-179. With 16 figs. [18 refs.]

³⁹ DA FONSECA (O.). Mycetoma by "*Aspergillus Amstelodami*."—*Rev. Med.-Cirurg. do Brasil.* 1930. Dec. Vol. 38. No. 12. pp. 424-430. With 2 figs. on 1 plate.

⁴⁰ DA FONSECA (O.). Besonderes Studium des *Coccidioides immitis* und des coccidioidischen Granulomas.—*Seuchenbekämpfung.* Vienna. 1930. Vol. 7. No. 4. pp. 237-250. With 6 text figs.

MALARIA.

BARBER (M. A.) & OLINGER (M. T.). **Studies on Malaria in Southern Nigeria. With an Appendix by PERSIS PUTNAM.**—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 361–501. With 3 figs. & 1 map. [7 refs.]

The majority of these observations were made in the coastal town of Lagos and the neighbouring villages. As the result of the examination of a single thick film, 61 per cent. of 6,838 men, women and children were found to have parasites in their blood; 13·3 per cent. had crescents, 22·6 per cent. had quartan parasites. The parasite index was relatively low in infants up to 4 months, it then rose rapidly and reached a maximum of 98·2 at 3 years; subsequently it fell slowly until the age of 16, and then dropped to 48·6 per cent. The percentage of crescent infections fell from above 25 per cent. in children under 4, to about 8 per cent. in older children and adults. The total percentage positive, 61·4, is far below that of the population in general, because a disproportionately large number of persons in the least infected age groups was included. The heavier crescent infections were commonest in infants, rare at four years and absent in older persons. The index of quartan was low in infants, rose to a maximum at 4 years, and then declined slowly, but remained fairly high even in adults. There was little evidence of a racial immunity, except possibly in the low infection index shown by infants 4 months old or younger. Anaemia was relatively higher in infants and young children, but the authors think that this anaemia is less than among white children equally parasitized.

At the time of examination clinical symptoms among infants seemed to be generally lacking, whether the infant was malaria positive or not. Nine infants died out of 268 who were under observation for 8 months. "Africans of this region never acquire a complete tolerance. . . . With regard to the question of racial tolerance . . . comparison with other races equally exposed to infection and equally well nourished is necessary to a decision."

A form of *A. costalis* (= ? var. *melas*) with very dark brown larvae and dark adults, some of which have the four-banded proboscis, occurs plentifully in the swamps surrounding Lagos. The average anopheline density in native houses was 5·1; the percentage infected, of 15,144 examined, was 12. The highest rate of infection—25·5 per cent.—occurred in September.

A. funestus is comparatively rare in the coastal districts, but is common in Ibadan, inland. *A. hargreavesi* and *A. moucheti* are also plentiful in Southern Nigeria and have a high infection rate. *A. costalis* will disperse at least half a mile from a large breeding place, and probably much farther. A very low adult density of this species seems to be adequate to keep up a high malaria rate. *A. costalis* is very uncommon in the large semiwooded swamps near Lagos. Anti-larval measures are especially difficult where these mosquitos abound, because they are adapted to a great variety of breeding places and their development is very rapid, thus enabling them to take advantage of temporary water. "We doubt if any larvicidal 'campaign' can alone cope with conditions found in West Africa."

W. Fletcher.

HENDERSON (L. H.). **Some Observations on the Incidence of Malaria amongst the Nilotic Tribes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Jan. 30. Vol. 25. No. 4. pp. 281-286.

The Nilotic tribes inhabit the Upper Nile Province of the Sudan, a marshy plain embracing the White Nile; they number about half a million. Malaria is chiefly benign tertian, with a few isolated foci of quartan; at government posts and trading stations subtertian occurs which has been introduced by Arabs from the north. Practically every child contracts malaria repeatedly and the infant mortality is very high; only the fittest survive, and it is rare to see any but sturdy children over 4 years old. Attacks recur frequently up to the tenth year, but by the age of 16 they are rare, and in adult life they only occur in those persons with some other debilitating disease. The average splenic index of children is 50 per cent., but for male adults it is only 0.05. In places where the splenic index of the children is lower, there is less immunity in adult life and therefore the adult index is higher. Near government posts, where the children are given quinine, there is also more malaria among adults. This immunity is specific for benign tertian malaria, and does not protect against subtertian or quartan. With repeated exposure to quartan during childhood, a similar specific immunity is produced, but this does not occur with subtertian.

W. F.

SERGEANT (Edmond), SERGEANT (Etienne), PARROT (L.), FOLEY (H.), CATANEI (A.) & SENEVET (A.). *Carte du paludisme en Algérie. [Map of Malaria in Algeria.]*—36 pp. With 28 text figs. & 2 folding maps. 1928. Algiers: Gouv't. Général de l'Algérie. Direction de l'Agriculture, du Commerce et de la Colonisation. Service Cartographique. (Jules Carbonel, Printer.)

This well-produced report gives an outline of the biology of the malaria parasite, and the way in which it is carried from man to man. It contains very clear maps showing the distribution of malaria in the country, and some excellent photographs of breeding-places, drainage, and the like. It is evidently intended for the use of the government administrators.

When France occupied the country about 100 years ago it was desolate and uncivilized, a condition which the authors attribute to its endemic malaria. A French general of that day referred to it as a barren rock where it was necessary to import everything except air, and even that was bad. Things are very different now, for with the help of the plough and quinine the colonists have changed the face of the country and malaria yields step by step to civilization; but it has not been "stamped out," and in certain zones it becomes epidemic.

The malaria charts in this report have been prepared from the figures of the splenic and parasitic indices collected over a number of years. Roughly speaking, the coastal regions in the north are the most malarious, and the disease diminishes as one proceeds south towards the Sahara, but a healthy district is often found alongside one that is malarious. The unhealthy places are invariably near water, such as rivers and swamps. Taking the villages of the coastal zone as a whole, the splenic index is about 36, and the parasite index is 11. This is in the spring, among native children 1 to 15 years old.

The principal anopheles are : (1) *A. maculipennis* which breeds in clear, stagnant, or slowly moving water containing weeds. (2) *A. algeriensis* which breeds in the same kinds of places, but is more common in the cooler, more mountainous parts. (3) *A. hispaniola* which is sometimes found along with *A. maculipennis* at the bottom of cliffs near the sea, but is more common in pools among the rocks in the northern Sahara. (4) *A. sergenti* is closely related to the last, and its breeding places are similar. (5) *A. multicolor* belongs essentially to the Sahara. It can live in water concentrated by evaporation, and richer in salt than the sea. Excellent photographs are given showing the breeding places of these various species.

W. F.

MATHEW (K. C.). **Report on Mosquitoes and Malaria at Aldabra and Assumption Islands.**—*Seychelles Ann. Rep. on Med. Dept. for Year 1930.* pp. 15–18 & Appendix J. pp. 51–53.

Aldabra Island is an atoll 24 miles long, 630 miles from Mahé the principal island of the Seychelles Archipelago. There are about 100 people on the island, and the staple industry is fishing and turtle catching. Assumption is an elevated coral reef about 20 miles away from Aldabra. Anopheles had never been found in these islands, though an outbreak of malaria occurred in Aldabra during the spring of 1908, and benign tertian parasites were found at the time. Labourers are imported from Madagascar and elsewhere already infected ; but it has generally been supposed that the disease did not spread because there were no anopheles. Epidemics of fever, however, were reported to have occurred in July 1929 on Assumption, and in October on Aldabra, and in January 1930, these islands were visited by Dr. K. C. Mathew. The epidemic in the island of Assumption had come to an end four months before his visit, and he found no malaria parasites, no enlarged spleens, and no anopheles ; consequently it is uncertain whether the epidemic was due to malaria or to some other disease. In Aldabra, on the other hand, there were several people with fever, many of whom had never been outside the colony during the course of their lives, and he found malignant tertian parasites in them all. Furthermore, on searching the pools with which the islands abound during a part of the year, he discovered the larvae of anopheles. The coral formation of the island, with its hard surface and innumerable little pits, would make antilarval measures both difficult and costly. Specimens of the anopheles were sent to London for identification.

W. F.

MACDONALD (G.) & MAJID (Abdul). **Report on an Intensive Malaria Survey in the Karnal District, Punjab.**—*Records of the Malaria Survey of India.* 1931. Sept. Vol. 2. No. 3. pp. 423–480. With 1 graph in text. [10 refs.]

The observations were made on villages within 20 miles of Karnal City, in the south-east of the Punjab. The district forms part of the vast alluvial plain below the Himalayas, and appears to be absolutely flat and level. Irrigation of almost all crops is necessary. The old Western Jumna Canal constructed by the Moghul emperors formerly ran a tortuous course through the district, and interfered with natural drainage ; it gave rise to swamps and caused malaria until the canal

was re-aligned in 1885, after which the district become relatively healthy. The principal carrier is *A. culicifacies*, and the most dangerous breeding places are the grass-grown distributaries leading from the Jumna canal, shallow grassy swamps formed by seepage from the main canal where it runs at a higher level than the surrounding land, farm tanks, and pools by the side of roads which obstruct drainage. In years in which the rainfall is normal or subnormal, the two factors influencing the severity of malaria are the proximity of *culicifacies* breeding places, and the severity of the last autumnal epidemic; presumably because of the greater number of gametocyte carriers.

W. F.

RICHMOND (A. E.). The Relation of Meteorological Conditions to Malaria Incidence amongst British Troops in Peshawar.—*Records of the Malaria Survey of India*. 1931. Dec. Vol. 2. No. 4. pp. 621–642. With 17 charts. [2 refs.]

Humidity is the most important factor influencing the incidence of malaria amongst troops in the non-monsoon area of the North West Frontier Province. Bad years are characterized by one or more ten-day periods between July 29 and August 28 with an average humidity of over 80 per cent. All the years with higher incidences of malaria are characterized by at least one ten-day period with average humidities of over 75 per cent. before August 18.

W. F.

IYENGAR (M. O. T.). The Distribution of *Anopheles ludlowii* in Bengal and its Importance in Malarial Epidemiology.—*Indian J. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 499–524. With 4 maps & 1 chart in text & 4 figs. on 2 plates. [5 refs.]

A. ludlowii, Theobald, is a Far Eastern species which has but a limited range of distribution in India where it is found only in the Andamans, Lower Burma, and Lower Bengal, and for this reason malariologists in Bengal have considered it to be of little importance. The author's investigations show that it has a much wider distribution in Bengal than is commonly supposed, and that it is very numerous in some areas: in view of this, and of its high susceptibility to infection, he urges that it should be recognized as an important transmitter in the province. It occurs in coastal districts, but may also be found a hundred miles inland along the banks of tidal rivers. It appears to be spreading, and the isolated foci of *A. ludlowii* on the banks of the Hooghly are probably the result of recent colonization, for these places have suddenly become intensely malarious, while the surrounding country, where there are no *A. ludlowii*, remains healthy. River-boats and trains probably play an important part in transporting mosquitoes: on one occasion the author caught a specimen of *A. ludlowii* near a railway station in a district where this mosquito did not occur. *A. ludlowii* is not found in the mangrove covered swamps along the banks of the rivers, but when the forest is cleared for agricultural purposes and the land is bunded in order to keep out the high tide, it breeds freely in the brackish pools which form in the low-lying ground. Photographs are given, showing a river with cleared and bunded land on one bank, where *A. ludlowii* breeds freely; on the other bank there is dense mangrove jungle, and *A. ludlowii* is not to be found. During the autumn of 1930, a severe

epidemic occurred in an industrial area on the left bank of the Hooghly. The incidence of anophelines in the houses was very high, and *A. ludlowii* was so numerous that it exceeded the others many times over. There were very few of these mosquitoes in villages a mile away, and their inhabitants were unaffected by the epidemic. The optimum salinity for the breeding of the *A. ludlowii* of Bengal is about 0.4 per cent., which is only one third of that of the *A. ludlowii* of the Dutch East Indies.

W. F.

MACDONALD (G.). **Report on a Malaria Survey in Bikaner State.**—*Records of the Malaria Survey of India*. 1931. Dec. Vol. 2. No. 4. pp. 603–619. With 1 graph. [4 refs.]

Bikaner City is the capital of the northernmost state in Rajputana. It is on the border of the great Indian desert, and is very dry; the average rainfall is 11.8 inches, but most of it falls in isolated storms; the subsoil water level is 350 to 385 feet below ground; in spite of this, grasses spring up after good rain and there is some cultivation. As water is so scarce it is conserved in tanks and cisterns. The normal mean monthly humidity never quite reaches 70 per cent., but it remains about 65 per cent. for three months; therefore the transmission of malaria is only just possible. The spleen rate is only 1.1. The carrier is *A. stephensi*, which breeds in the tanks and cisterns. Outside the town, there are two palaces, by the side of an artificial lake. There is much more malaria there than in the town; the spleen rate was 19 per cent. and both *A. stephensi* and *A. culicifacies* were caught in the servants' quarters. The lake raises the relative humidity, and provides breeding places.

W. F.

COVELL (G.) & BAILY (J. D.). **Malaria in Sind. Part IV. Malaria in Nawabshah District. Part V. Malaria in Umarkot and Chhachhro Talukas of Thar and Parkar District (Lower Sind). Part VI. Post-Epidemic Conditions in a Rice-growing Area in Kambar Taluka, Larkana District. Part VII. Malaria in the Upper Sind Frontier District.**—*Records of the Malaria Survey of India*. 1931. Dec. Vol. 2. No. 4. pp. 507–526. With 1 map. [3 refs.]; 527–536. [4 refs.]; 537–543. [4 refs.]; 545–568. [2 refs.]

These papers continue the series on malaria in Sind [see this *Bulletin*, Vol. 28, pp. 106 and 578], and demonstrate the different conditions met with in different parts of the country and the influence of irrigation. Thus at Jacobabad, with average rainfall of 3 inches per annum, the splenic indices were 70–80; here as elsewhere *A. culicifacies* is the usual carrier.

A. G. B.

SCHARFF (J. W.). **The Singapore Cold Storage Dairy Farm in its Relation to Antimalaria Control Measures.**—*Malayan Med. Jl.* 1931. Sept. Vol. 6. No. 3. pp. 82–87. With 5 figs.

This is an example of the adaptation of permanent antimalaria drainage to serve as a water supply. The farm site comprises an area of 55 acres consisting of fertile ridges intersected by steep ravines,

with granite outcrops here and there. One of the reasons for the choice of this site was the abundant water present in the form of springs and seepages, but it would have been difficult to find a place more potentially malarious. When jungle clearing began, there was such a serious outbreak that the scheme could not have been carried out unless antilarval measures had been adopted. "The dramatic disappearance of malaria is certainly due to the fact that it was possible to eradicate rapidly and completely within the half mile zone of the farm all breeding place of the dangerous mosquitoes." Temporary oiling was employed until the permanent drainage was completed. The permanent drainage was effected by means of 5 inch subsoil pipes, laid at an average depth of $5\frac{1}{2}$ feet. These pipes lead into an underground reservoir from which water is pumped into a service tank for farm use; it is of excellent quality, and, even in dry weather, the amount available is no less than 75,000 gallons daily. The sides and floors of the ravines are now quite dry, and are to be planted with kikuya grass which has been imported from Australia on account of its spreading and clinging properties.

A most interesting discussion followed this paper. Dr. SELWYN-CLARKE, the Chief Health Officer of the Federated Malay States, said that though the value of subsoil drainage in urban areas was fully appreciated, there appeared to be good grounds for believing that contour drainage and oiling were better suited to rural areas. In support of his contention he instanced the case of a rubber estate on which a system of subsoil drains was constructed by the government antimalaria engineer in 1916-1925. This was a failure, and the system was reconstructed in 1926-27, only to fail once more, at a total cost to the government (apart from the contribution of the estate) of \$40,000, or £4,600. "Objections to subsoil drainage on estates included high capital cost, high maintenance charges (4 per cent. to 6 per cent. annually) the sacrifice of 5 per cent. to 10 per cent. of the planted area and the need for skilled supervision."

The next speaker, Dr. MACAULEY, who has had more than twenty years' experience of the Malay States, agreed that open drains and oiling were more satisfactory on estates than subsoil drainage. Dr. MACASKILL, with an equally long experience, also agreed in the main, but suggested the use of subsoil pipes at the heads of ravines in order to prevent the scouring away of the soil in heavy rain.

Dr. Scharff said in reply that "though he was an advocate of subsoil drainage near towns and large villages in Malaya, yet he did not think that subsoil drainage was as a rule applicable to estates unless some additional object could be served such as had been achieved at the Cold Storage Dairy Farm." [Many miles of subsoil drains have been buried in the rubber estates of Malaya. Up to a few years ago, local opinion was so much in favour of this form of drainage that few dared to question its infallibility and one would like to know the reason for this rather sudden change.]

W. F.

SAMUELS (W. F.). **Anti-malarial Work at the Central Mental Hospital, Tanjong Rambutan, Malaya.**—*Jl. Mental. Sci.* 1931. July. Vol. 77. No. 318. pp. 555-561.

This is a good example of malaria caused by clearing away undergrowth in ravines. A new ward was built on a site which had been

pronounced to be healthy after a survey; the only doubtful point being a potentially dangerous ravine, a furlong away, thickly grown with *blukar*. [Blukar is the thick tangle of creepers, ferns and undergrowth which fills the ravines of Malaya in their natural state and prevents the breeding of the dangerous *A. maculatus* in the streams buried beneath it.]

This ravine was in a rubber estate belonging to a Chinese who agreed not to clear away the blukar, and all went well until, a few years later, the estate was sold to a British company who cleared the ravine, with the result that malaria broke out among the patients in the new ward. A great deal of excellent drainage work has been carried out by Dr. Samuels with gangs of patients. They have been taught to make subsoil drain-pipes, and concrete inverts. Before the china-clay used in manufacturing these pipes was discovered on the hospital reserve, subsoil drains were improvised with empty condensed milk tins, placed end to end. "The bottom row consisted of 4 tins, the next of 3, the top row of 2 tins, the gaps between the various rows forming the channel for the water. These tin subsoil-drains proved most efficient, and lasted for years."

W. F.

JACQUES (F.). **Possible Contributing Causes of a Small Outbreak of Malaria in a Controlled Area.**—*Malayan Med. Jl.* 1931. Dec. Vol. 6. No. 4. pp. 125-126.

During abnormally dry weather, malaria occurred in a district of the town of Taiping, and also on some neighbouring rubber estates which had hitherto been free from malaria. The carrier, *A. maculatus*, was found breeding in situations which it normally shuns, such as concrete antimalarial drains and cemented wells. The author suggests that when the mosquito's usual breeding places are destroyed artificially, or by drought, it will lay its eggs in any available small, still or slowly moving, collection of clean water.

W. F.

GREEN (Richard) & GATER (B. A. R.). **The Relative Susceptibility of Some Malayan Anopheline Mosquitoes to Experimental Infection with Malarial Parasites.**—*Bull. Inst. Med. Res. Federated Malay States.* 1931. No. 4. 17 pp. [15 refs.]

A. kochi is widely distributed in Malaya, and is found near houses in large numbers, but epidemiological observations have shown that it is of little or no importance as a carrier. Naturally infected specimens have been found in the Dutch East Indies, but not in British Malaya. It is therefore surprising that the authors found it more readily infected experimentally, 82 per cent., than the notorious carrier *A. maculatus*, 67 per cent. It did not feed so readily on human blood, 46 per cent., as *A. maculatus*, 72 per cent. Though a species is easily infected in the laboratory, it does not follow that it is an important transmitter in nature. (The duration of life in captivity probably gives no true indication of the natural life-span. Possibly *A. kochi* seldom lives long enough to become a carrier. To become dangerous it would have to show an increased liking for human blood.

W. F.

HARRIS (F.). **The Military Malaria Problem in Hong Kong.**—*Jl. Roy. Army Med. Corps.* 1932. Jan. & Feb. Vol. 58. Nos. 1 & 2. pp. 5-23; 92-102. With 6 figs. & 2 maps. [4 refs.]

Hong Kong is the fourth port in the world, and is the only Imperial coaling station east of Singapore. The island was ceded to Great Britain in 1841, the peninsula of Kowloon is held in perpetual lease, and the New Territories on the mainland on a ninety-nine year's lease from 1898. The towns of Victoria and Kowloon have a population of 600,000 of which 8,000 are British. The military population is 4,000. The whole colony is extremely hilly and consists of granite ridges separated by narrow valleys. In 1844, three years after the founding of the colony, malaria was so rife that there was serious talk of abandoning the island; but with the development of Victoria the disease declined and now there is none in the town. In Kowloon, first occupied in 1865, the same thing occurred, and as it was built over malaria disappeared. Malaria to-day is still potent in the rural and suburban districts where *A. maculatus* and *A. minimus* breed in the clear hill streams; not only Europeans, but even Chinese from north China who go into these districts, suffer severely, though the local Chinese appear to have acquired an immunity or tolerance. In the Peak district (altitude 1,200 to 1,700 feet) where many of the Europeans live, at the back of Victoria, there is no malaria, though *A. maculatus* is present. The troops in barracks in the country districts and in training camps suffer rather severely from malaria. About half of the infections are subtertian and the other half benign; quartan is rare. It has long been realized that any anti-malaria measures carried out on War Department land in Hong Kong cannot be altogether successful so long as the adjacent land outside military control is swarming with anopheles, and unfortunately there is no prospect that the Civil Authorities will do anything in the matter. The most important military anti-malaria measures at present available are: avoidance of camps before the middle of November; oiling; screening by nets; drainage (not yet available to full extent); repellants. The results obtained in 1930 were not unpromising. Prophylactic quinine in doses of 10 grains every evening, given to soldiers in camp, proved useless and will not be repeated. Mosquito nets slung in bell tents are useless, and now the kind of marquee known as "tents, I.P. privates" is in regulation use during the camping season in the Hong Kong and Liensin areas. An illustration of this tent is given showing the nets slung from two parallel bamboo poles.

W. F.

ARCHIVES DES INSTITUTS PASTEUR D'INDOCHINE. 1930. Oct. No. 12. pp. 3-110. With 3 plans, 5 charts & 17 figs. on 10 plates.—*Le paludisme en Indochine* [MORIN (H.); BORDES (L. A.); MESNARD (J.)]. [**Malaria in Indo-China.**] Index bibliographique des principaux travaux publiés sur le paludisme en Indochine.

The whole of this number of the Archives is devoted to this important subject. Dr. L. A. Bordes contributes a historical note in which he calls to mind that it was SIMOND who, as long ago as 1907, originally pointed out that, as regards malaria, Indo-China consisted of two distinct parts: first, the populous, flat, open country of the coastal deltas; and, second, the jungle-covered, mountainous interior.

Malaria exists in the coastal plain, but it is mild and easily dealt with ; the only severe cases occur in explorers and prospectors, who have returned from the interior ; though, occasionally, there are epidemics of limited distribution after some disaster such as a typhoon or, it may be, following the introduction of a malignant strain of parasite from the hinterland.

In contrast to this, malaria of a most malignant type exists in the hilly interior. In the past, labourers working on roads and railways, and soldiers on military expeditions, suffered terribly, but it was not until the country began to be developed for rubber planting, by imported Annamite and Chinese labour, that the problem became really serious. The mortality among the pioneers was terrible, and quinine appeared to be useless as a preventive. A laboratory of medical entomology was founded under Dr. BOREL and, in 1926, the Government instructed the Pasteur Institute to study the health conditions of estates ; Dr. H. Morin was put in charge of this investigation.

Dr. Morin contributes a résumé of the researches which have been made into the etiology of malaria in Indo-China, and, with Dr. L. A. Bordes, describes the antimalaria work which is being done. He has confirmed BOREL's finding to the effect that the anopheline fauna of the interior resembles that of the Federated Malay States, and the excellent photographs at the end of the book, are very like photographs of Malaya. Malaria is at its worst in the red laterite areas—the *terres rouges*—and it is there that *A. maculatus* (Malaya's most important carrier) is to be found. Wherever malaria is severe, either *A. maculatus* or *A. minimus* is to be found. Where *A. minimus* is present alone there is less malaria than in places where *A. maculatus* is present as well, and, though this mosquito has not been found infected, there is no doubt that it is a most important carrier.

Drs. J. Mesnard and L. A. Bordes contribute a paper on the importance of the indigenous Moïs as a reservoir of malaria (see this *Bulletin*, 1931, Vol. 28, p. 580).

W. F.

MORIN (H.) ; FARINAUD (M. E.) ; TOUMANOFF (C.) ; MORIN (H.).
Recherches sur le paludisme au Tonkin. [**Malaria in Tonking.**] (Bassin du Fleuve-Rouge.—Saison sèche 1931.) 1. Orientation et méthodes des recherches [MORIN].—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. June. Vol. 9. No. 6. pp. 387-395 ; 2.—Premières constatations épidémiologiques [FARINAUD].—*Ibid.* pp. 396-406 ; 3.—Revision de la faune de la moyenne région: les vecteurs du paludisme local [TOUMANOFF].—*Ibid.* pp. 407-428 ; 4.—Premiers résultats acquis au Tonkin [MORIN].—*Ibid.* pp. 429-447. With 1 fig. [Pasteur Inst. Hanoi.]

This is an account of the work of the newly created anti-malaria service of the Pasteur Institute of Hanoi during the dry months of the year, January to April. There is practically no malaria in the flat, rice-growing country of the coastal delta ; further inland some places are healthy and others, especially where irrigation is in force are malarious ; the mountainous country of the interior is notorious for malaria of a most malignant type. Three species of anophelines, which are rare or absent in the healthy flat country, are common among the mountains and in the hilly unhealthy portions of the intermediate zone ; these are *A. minimus*, *A. maculatus*, and *A. aconitus*. The

first species has been found infected during the present inquiry. Malaria is essentially a focal disease which depends on the presence of breeding places for the local vectors.

W. F.

ANAZAWA (K.). **Observations on Natural Malaria-Infection of the Various Formosan Anophelines, with Reference to the Critical Value of Each Species from the Malaria-epidemiological Point of View.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1931. Oct. Vol. 30. No. 10 (319). [In Japanese. English summary pp. 75–76.] [Govt. Research Inst., Formosa.]

The following were the results of an examination of Formosan anopheles. The figures are the rates of natural infection found by the author.

A. sinensis Wiedemann: 0.8. Remains in stable or house, but more often in stable, after biting.

A. minimus Theobald: 2.4. Remains in stable or house, but more often in house, after biting. It is known as the "house mosquito."

A. maculatus Theobald: 0.4. Homophilic, but does not remain in house after feeding.

A. fuliginosus Giles: 0.2. Chiefly zoophilic, but does not remain in stable after feeding.

A. tessellatus Theobald: 1.9. Found in both houses and stables, but prefers human blood. Remains in house, after feeding, but not to same extent as *minimus*.

A. splendidus Koidzumi: 2.3. Only scanty material available, and further investigation is needed. Habits similar to those of *tessellatus*.

A. hatori: 0.6. Chiefly zoophilic. Sometimes remains after feeding.

A. pleccau: 0. Seldom invades houses or stables. Lives in the mountains.

The perniciousness of a species depends upon its transmitting ability, distribution, and seasonal prevalence.

W. F.

MANALANG (C.). **Malaria Transmission in the Philippines. I–VI.**—*Philippine Jl. Sci.* 1931. Vol. 45. pp. 241–249; 367–381. Vol. 46. pp. 47–59; 247–255; 363–369; 371–375. With 6 text figs. & 1 plate. [Refs. in footnotes.]

i. **The Natural Vector.** pp. 241–249. With 1 text fig. & 1 plate. [9 refs.]

Among 10,820 *A. funestus* (*minimus*) 34 positives were found. No positives were found among 2,008 *A. maculatus*, 11,280 *A. ludlowii*, 3,657 *A. philippinensis*, or 1,445 *A. fuliginosus*. One positive stomach was found in a specimen of *A. vagus* among a mixed lot of 17,810 *A. rossii* examined. The conclusion is that *A. funestus* (*minimus*) is the natural vector in the Philippines.

ii. **Infection of *Anopheles funestus* ²Giles (*minimus*) with Notes on its Density, Probable Range of Flight, and Larval Control.** pp. 367–381. With 1 text fig. [Refs. in footnotes.]

Mosquitoes were trapped in a small wire-gauze hut in which the catcher slept. Catching adult mosquitoes in a trap affords a trustworthy index of mosquito density; the larval index fails in this

respect for it may be high at a time when mosquitoes are few. During the period of observation, there was a natural decrease in the anopheline density from November 1928 to 1930, quite unconnected with antilarval measures, though it might easily have been attributed to them. The flight range of *A. funestus* appeared to be greater than 1.5 kilometres (about a mile) which is the limit of economic efficiency. Paris green is therefore ineffective as a control measure in the Philippines.

iii. **Density and Infective Density of *Anopheles funestus* Giles.** Vol. 46. pp. 47-59. [Refs. in footnotes.]

"Much malaria with few transmitters and vice versa exist, and can be explained by a knowledge of the density and the infective number in the place at the time. Natural unexplained marked decline in density has been observed in two places and explains the sudden disappearance of transmission in certain uncontrolled localities, which are often attributed to antimalarial measures in controlled areas."

Numerical prevalence means little unless the percentage of infected mosquitoes is known.

iv. **Meteorological Factors.** pp. 247-255. With 3 text figs. [3 refs.]

A. funestus shows a rise in the rate of infection with an increase of rainfall, mean temperature and relative humidity. It breeds in permanent or temporary streams, and the influence of the rainy season on breeding probably explains the seasonal distribution of malaria in the Philippines.

v. **On the Maturation of the Ova of *Anopheles funestus* Giles.** pp. 363-369. With 1 text fig. [6 refs.]

A higher rate of infection in *A. funestus* coincides with the higher rate of females containing mature ova. This conclusion is opposed to that of JAMES and SWELLENGREBEL in Europe, but agrees with the finding of American workers in connexion with *A. quadrimaculatus*.

vi. **The Dark-Night Factor.** pp. 371-375.

A study of malarial infection in a construction camp showed that transmission occurred four times more frequently on dark nights than when the moon was bright, and 87 per cent. of the infected mosquitoes were caught when there was no moon or when it was obscured by clouds.

W. F.

HOLT (R. L.) & RUSSELL (P. F.). **Spleen Survey of the Eastern Shore of Bataan Province, Luzon.**—*Philippine Jl. Sci.* 1931. June. Vol. 45. No. 2. pp. 211-219. With 1 text fig. [2 refs.]

A rapid malaria survey of this coast was made prior to military manoeuvres in the districts. From the examination of 900 school children it was concluded that malaria does not exist on the eastern coastal plain of Bataan except in cases imported from the foothills; as the foothills are approached, the spleen-rate becomes progressively higher. *A. ludlowi* is plentiful in the salt marshes of the coast, but it does not carry malaria in this district. *A. minimus* was found in several places, but it is not an effective vector in the coastal plain.

W. F.

BENARROCH (E. I.). **Studies on Malaria in Venezuela.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 690-693. [2 refs.] [Lab. of the Internat. Health Division, Rockefeller Foundation, Maracay.]

The author summarizes his paper as follows :—

" Out of sixteen species of *Anopheles* recorded as occurring in Venezuela, only *A. albimanus* and *A. darlingi* have been proved to be vectors of malaria by dissections. Observations on the relative abundance of various species of *Anopheles* during a localized outbreak of malaria in a boys' school suggest that *A. bachmanni* is probably also a vector of the disease."

W. F.

SCHÜFFNER (W.). **Notes on the Indian Tour of the Malaria Commission of the League of Nations.**—*Records of the Malaria Survey of India.* 1931. Sept. Vol. 2. No 3. pp. 337-347.

[Though many of these notes cover the same ground as the report of the Commission summarized on page 571 of Vol. 28 of this *Bulletin*, some of them express, or emphasize, the individual views of Professor Schüffner himself.] In both the Terai and the Duars, at the foot of the Himalayas, there are two very different races of people. (a) First, the Buxas and Tharus who are indigenous and suffer comparatively little from malaria, although the spleen rates of the children are 100 per cent. and those of the adults are very high. Soon after birth, the children are exposed to infection with the local strains of parasites, and those that survive develop a relative immunity. A perfect immunization is found only among a small minority of the inhabitants ; as in Sumatra, splenic enlargement persisting during adult life bears witness to the sufferings from malaria endured in youth. (b) The second race in these areas consists of the Desis who have immigrated from the over-populated plains. The effect of the local malaria on these immigrants has been most unfortunate, and the population is only kept up by constant recruitment from the plains. The Desis have not been immunized by constant exposure to malaria from birth, and it is because of their immigration that acute epidemic malaria occurs in the Terai side by side with the endemic form. Possibly, the strains of malaria which the immigrants import from the plains are stimulated to an exaggerated multiplication, or even virulence, through the influence of the local anophelines.

" Even if the use of paris green becomes very much extended in India, I do not believe that it will prove the solution of the malaria problem . . . oil, paris green, and quinine are only palliatives which we cannot yet do without. But the future lies in biological methods . . . irrigation and drainage, more especially subsoil drainage, are biological methods " ; other examples are the growing of brush-wood to shade streams, the periodical flushing of water courses, and the treatment of fish-ponds in Java (see this *Bulletin* 1930, Vol 27, p. 640).

With reference to blackwater fever, the Commission is satisfied that the distribution of the disease in India is clearly opposed to the view that it is merely a complication of malaria in places where the incidence is sufficiently high. Blackwater is observed in some areas where the spleen rate hardly reaches 50 per cent. ; it is absent in other districts where the rate is 100 per cent. Probably malaria with **a**

tendency to blackwater has a different etiology from the ordinary form, and may be associated with a specific plasmodium, which SINTON suggests is *P. tenue* Stephens. Again, certain species of anopheles may be capable of modifying the parasites in such a manner as to make them more apt to provoke blackwater. It may even be that certain races of mosquitoes exert this influence, for different races of the same species behave very differently as regards malaria: for instance *A. subpictus* (*rossi*) has never been found infected in British India, and *A. hyrcanus* (*sinensis*) is of no importance there; yet, both these mosquitoes are active carriers in the Dutch East Indies. On these grounds, the attempts of STRICKLAND and his collaborators to group varieties such as *A. minimus*, *A. aconitus*, *A. listonii* and *A. varuna*, into a single species under the specific name of *funestus* are likely to cause confusion. Another possible cause of blackwater is a combined infection of the plasmodium and some other parasite such as Bartonella.

W. F.

IYENGAR (M. O. T.). **The Relative Value of the Oöcyst Rate and the Sporozoite Rate in Anopheles.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 525-539. With 3 charts & 1 graph in text. [1 ref.]

Where only gut infections, and never salivary gland infections, are observed in a species, it is evident that certain factors prevent the development of the oöcysts, and the infection rate based on oöcysts may not represent the transmitting capacity of the species in relation to the period of observation. "But where both gut infections and gland infections occur side by side, often in the same individual specimen, under such circumstances, oöcyst infections should certainly be included in the total infectivity rate in order to appraise the transmitting capacity of the species." (See SWELLENGREBEL and DE BUCK, this *Bulletin*, Vol. 28, p. 1018.). The maximum sporozoite infection and the highest infestation were found to occur during the 9th to the 12th day after the collection of mosquitoes for examination. From this date the sporozoite rate declined as the result of the discharge of sporozoites when the mosquitoes fed on the raisins supplied to them in their cages. The same would happen under natural conditions when mosquitoes obtained no further feeds of infected blood, or on the approach of winter when the development of oöcysts is stopped.

W. F.

BOURGUIGNON (G. C.). Contribution à l'étude de l'évolution spontanée du paludisme. [**The Course of Untreated Malaria.**]—*Ann. Soc. Belge de Méd Trop.* 1931. June 31. Vol. 11. No. 2. pp. 139-149. With 12 text figs.

During a short visit to Shabunda (Kivu, Belgian Congo) the author had the opportunity of studying malaria among a people to whom quinine was unknown. The parasite index in children under eighteen was 82.6, in adults it was 56.5, and he calculated the natural rate of

spontaneous recovery, without drugs, at 31.6 per cent. The gametocyte index among the children was 24.7; among the adults it was only 14.5. The splenic index was 76.8 in children, and 12.2 in adults.

W. F.

STRATMAN-THOMAS (W. K.). **On the Supposed Antagonism between Alfalfa and Malaria.**—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 394–410. With 1 diagram. [13 refs.]

WILLCOCKS suggested that certain parts of Egypt were relatively free from malaria because leguminous crops, such as clover, were cultivated there (this *Bulletin*, 1928, Vol. 25, p. 557). D'HERELLE (1924) supposed that the decline of malaria in many parts of the Netherlands coincided with the introduction of melilotus, and that in the Argentine the freedom of the clover districts was due to the feeding of the anopheles on the nectar of the clover flowers. He suggested that the glucoside coumarin, present in dried clover, killed the plasmodia in the mosquito. Bruce MAYNE (this *Bulletin*, 1930, Vol. 27, p. 658), however, has demonstrated that coumarin has no plasmodicidal value in mosquitoes. The author examined 1858 people on 13 plantations situated in the Mississippi delta, where there has been an almost uninterrupted decline in the mortality from malaria since the introduction, 25 years ago, of the leguminous alfalfa in place of the cotton crops which had been ruined by the boll weevil. He found that the malaria index of the total population was 3 per cent., but that in areas near standing water it was 9.45 per cent., whether alfalfa was growing there or not. He found no correlation between the distance of residence from alfalfa and the incidence of malaria. Alfalfa will not grow in a waterlogged soil, and therefore the land is drained where it is cultivated; this is the only connexion between alfalfa and malaria prevention. "People living adjacent both to standing water and alfalfa are not protected from malaria by alfalfa . . . wherever a decline in malaria incidence coincides with the planting of alfalfa this decline is due directly to the proper drainage necessary . . . for the cultivation of alfalfa."

W. F.

KLIGLER (I. J.) & MER (G.). **Studies on Malaria. VIII. The Migration of Infected *A. elutus* at Various Seasons of the Year.**—*Jl. Preventive Med.* 1931. Sept. Vol. 5. No. 5. pp. 401–407. With 1 text fig. [3 refs.] [*Hyg. Dept., Hebrew Univ., Jerusalem.*]

The authors have previously published evidence that *A. elutus* covers distances up to 8 kilometres (5 miles) during its hibernation flight, while its range at other times is little more than a quarter of this distance. (See this *Bulletin*, 1929, Vol. 26, p. 6; and, 1931, Vol. 28, p. 589.)

The present paper records the results of further observations in the same area. The inhabitants of a given district were treated with chinoplasmine, and the incidence of infected mosquitoes was observed among them and in neighbouring untreated villages. It was again found that during the pre-hibernating period, a wide-range dispersion occurs, amounting to 12 kilometres; and also that treating the population

near the breeding area leads to a diminution of infected mosquitoes, not only in the treated villages but also in those far from the breeding zone.

W. F.

MARTINI (E.). **Spring Malaria. Convincing Observations by Bergman before the Time of Laveran.**—*Riv. di Malariologia*. 1931. July-Aug. Vol. 10. No. 4. pp. 512-514.

The author republishes part of an essay published by FLENSBURG in 1912, containing numerous examples—some of them made more than a hundred years ago—of spring malaria resulting from infection in the previous year. This prolonged incubation was not, therefore, as SWELLENGREBEL supposes, first noticed by KORTEWEG. The author does not agree with SWELLENGREBEL that spring malaria is due to infection in the previous autumn—October to December—but believes that it is contracted in summer and early autumn. BERGMAN wrote in 1875 and 1877.

W. F.

DE BUCK (A.), SCHOUTE (E.) & SWELLENGREBEL (N. H.). *Nouvelles recherches sur les races d'*Anopheles maculipennis* aux Pays-Bas. (Leur rapport avec l'anophélisme sans paludisme. Comparaison avec ce phénomène tel qu'il existe au Bengale et en Assam.)* [**Races of *A. maculipennis* in the Low Countries. Anophelism without Malaria.**].—Reprinted from *C.R. 2e Congrès Internat. du Paludisme*. Algiers. 1930. Vol. 1. pp. 293-299.

There are two races of *A. maculipennis* in the Low Countries: a hibernating race, and a non-hibernating race. Both cease to lay eggs at the beginning of September, but, while the hibernating race also ceases to feed, the non-hibernating race continues to do so (Gonotrophic dissociation, see this *Bulletin*, 1930, Vol. 27, p. 196), and it is just at this time that the transmission of malaria takes place. Malaria occurs in places where the non-hibernating mosquitoes are plentiful, but not in those where only the hibernating variety is found, because the latter do not feed during the malaria season, which is in the autumn. Even if they are roused to feed by artificial warmth, digestion of blood is very slow and it is difficult to infect them during the winter, though the non-hibernating race is easily infected. The latter breeds readily in confined spaces, but the hibernating race will not breed in captivity, a nuptial flight is necessary for it, and for this purpose it is adapted by its larger size and longer wings. The shorter winged non-hibernating race, in which copulation takes place without a nuptial flight, is an indoor mosquito. The hibernating race, in August, feeds largely on vegetable juices, the crop is filled with a clear fluid and the fat-bodies enlarge; this does not occur in the other race. There are several other morphological distinguishing features in adults, larvae and eggs. The dangerous, non-hibernating race breeds in brackish water, the other race breeds in sweet water, and the author suggests that the former can be abolished by agricultural development which will keep out the sea. It is uncertain whether the two races are simple modifications due to environment, or whether they are hereditary varieties; but the non-hibernating race retains its character when artificially cultivated in the laboratory for several generations.

W. F.

BRIGHENTI (Dino). Anofelismo senza malaria e specie anofeliche. [**Anopheline Species and Anophelism without Malaria.**—*Arch. Ital. Sci. Med. Colon.* 1931. Oct. 1. Vol. 12. No. 10. pp. 595–600. English summary (7 lines). [Zool. Inst., Univ., Bologna.]

As a result of investigation of places where *Anopheles* exists but malaria is absent the author finds that *A. maculipennis* constitutes 95 per cent. or more of the species found; e.g. in Jolanda (Savoy) where *A. sacharovi* may be found up to 3 per cent., or bonificated parts of Bologna where the same and *A. pseudopictus* together amount to about 5 per cent. only, whereas in malarious districts not only are there other species but they constitute from 20 to 50 per cent. of the total. Thus in the malarious parts of Ferrara are found *A. maculipennis*, *A. sacharovi* (20–50 per cent.), *A. algeriensis* and *A. bifurcatus*; in Macedonia, the first two and *A. superpictus*. In short, the author concludes that where *A. maculipennis* is present almost alone or very greatly predominating, there is anophelism without malaria. He ascribes this [but without adducing much evidence] to the adaptability of *A. maculipennis*; where there is bonification, or gamete carriers are few, the blood of cattle is preferred to that of man.

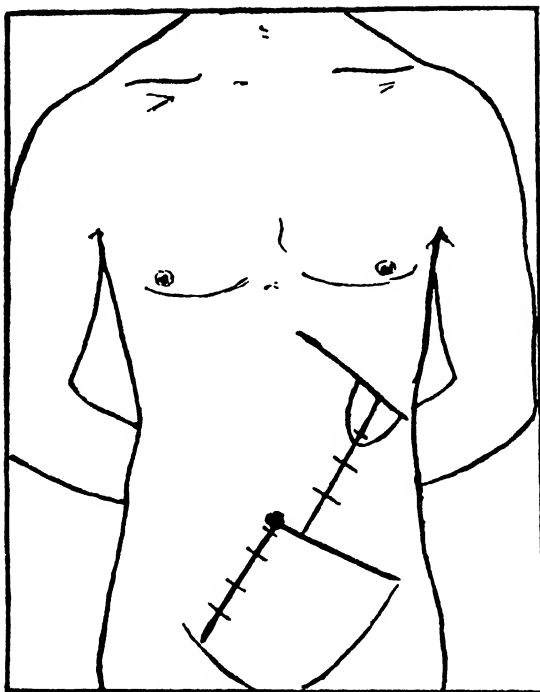
H. H. S.

AMSTERDAM. BUREAU D'ENCOURAGEMENT POUR L'EMPLOI DE LA QUININE. Le paludisme et l'enfant. [**Malaria in Childhood.**]—Reprinted from *Rev. Internat. de l'Enfant*. Geneva. 1931. Vol. 12. 75 pp. With 22 figs. [76 refs.]

Malaria lowers fertility, provokes abortion, and kills the newly born. Sir Patrick HENDER estimated that malaria causes some 300,000 miscarriages every year in Bengal alone; BLACKLOCK and GORDON found that in confinements where the placenta contained parasites, 25 per cent. of the infants died within a week. Touching the question of hereditary malaria "opinions are divided; it seems, however, that the theory of heredity rests on a firm basis, though its advocates have not yet clearly demonstrated the route by which infection occurs." On the question of quinine during pregnancy, it is the opinion of the authorities quoted that malaria is far more dangerous and more likely to cause abortion than quinine, which should on no account be withheld. It acts as an abortifacient only when abortion is imminent.

With reference to the excretion of quinine in the mother's milk and its administration to the suckling by this route, the figures quoted show that this method cannot be trusted: during the first hour after quinine has been administered to the mother, her milk contains a minute quantity of the drug, but too little to be of much use, and after the first hour it contains none.

The method of spleen measurement recommended here is SCHÜFFNER'S (see this *Bulletin*, 1923, Vol. 20, p. 551): a line is drawn along the left costal arch, and a second line parallel to the first is drawn from the umbilicus. These two lines are joined by a third passing through the apex of the spleen. This third line is divided into four equal parts, and a spleen which lies on the first quarter is called a "spleen 1," and so on. For spleens which pass the umbilicus, the junction line is prolonged; extreme enlargement of the spleen is in "spleen 8." The next section of the pamphlet deals with the statistics of child malaria in different parts of the world, and this is followed by



SCHUEFFNER'S method for determination of the splenic index.

[Reproduced from the *Transactions of the 4th Congress of the Far Eastern Association of Tropical Medicine*]

a chapter on prophylaxis and treatment. It is hopeless to hand quinine to native children and to trust them to swallow it; if it is impossible for the medical man to administer it himself, it should be given by the teachers when the children are at school.

A subsection on propaganda includes reproductions of several posters used in the Dutch Indies and elsewhere, and also a Spanish hymn to quinine which is sung in the schools of Panama. With regard to the posology of quinine opinions differ:—Professor Peter MÜHLENS recommends; up to 2 years, 0.05 to 0.10 gram; up to 4 years, 0.2 gram; up to 6, 0.3, up to 8, 0.4; and so on, increasing 0.1 gram for every two years until 1 gram is reached at 18 years. When equinine is given the dose should be $1\frac{1}{2}$ times as large. (See also CLEMESHA, this *Bulletin*, 1931, Vol. 28, p. 576.)

W. F.

MAYNE (Bruce) & GRIFFITHS (T. H. D.). *Anopheles atropos* D. & K.—**a New Potential Carrier of Malaria Organisms.**—*Public Health Rep.* 1931. Dec. 25. Vol. 46. No. 52. pp. 3107–3115. With 3 figs. on 1 plate.

Anopheles atropos is a dark mosquito with an unspotted, almost transparent wing, and it assumes a hunched-up stance, like a culex. It breeds in salt marshes with a salinity of 3 to 21 per cent. It attacks in direct sunlight as well as by night, and has been found in large numbers in occupied rooms. In infectivity tests it proved equal in efficiency to

A. quadrimaculatus as a potential carrier of *Plasmodium vivax*. It has been found in Mississippi, Louisiana, Alabama, and Florida.

W. F.

WATSON (M.). **Some Clinical Features of Quartan Malaria.**—Reprinted from *Jl. Malay Branch Brit. Med. Assoc.* 1904. Jan. New Ser. No. 1. 16 pp. Reprinted with added Preface dated Jan. 3, 1932.

Considerable interest in quartan malaria and nephritis has been aroused by the recent work of GIGLIOLI and others. This paper gives the early work of the author on quartan, and shows how often it kills in cold blood, masquerading as some non-febrile disease. Work in Malaya on the association between quartan malaria and nephritis seems to have been entirely overlooked. In 1912 J. Tertius CLARKE of the Malay States wrote "Every medical man knows that, given the malaria parasite, he may find albuminuria, but he does not know that, given the albuminuria without fever, he may find malaria parasites in over 50 per cent. of the cases, and of these almost 100 per cent. are quartan." It is for these reasons that the paper is republished. In 39 per cent. of 66 quartan cases, the fever was recognizable as such; in 24 per cent. it was mainly quotidian; in 36 per cent. there was no fever, or it occurred only at long intervals. Oedema was prominent in 32 per cent., and, in many of these cases, the urine contained albumen. Diarrhoea, dysentery, pulmonary complications, and pyogenic infection were frequent complications, and this explains why the fall in the death rate from malaria which follows successful malaria control is accompanied by a fall in the death rate from other diseases. The author mentions, in his preface, that he doubts the occurrence of "malarial hyperpyrexia."

W. F.

MARCHOUX (E.). Variétés nouvelles sur le paludisme. [**Malarial Novelties.**]—*Bull. Acad. Méd.* 1931. Oct. 13. Year 95. 3rd Ser. Vol. 106. No. 31. pp. 183-188.

The author outlines the mode of transmission of malaria to man by the mosquito, ROUBAUD's theory of the protection of man by domestic animals, and the importance of the house as the place of infection. He then discusses treatment. Although relapses may occur after plasmoquine they are less common than after quinine. One of several curative products prepared at the Pasteur Institute in Paris by FOURNEAU, and bearing the number 710, is therapeutically as active as plasmoquine, it is less toxic, and, if one may judge from the experiments of SERGENT with *P. relictum* of the canary, it has a similar action on sporozoites. It is related chemically to plasmoquine, and is a N-diethylaminopropyl-8-amino-6-methoxy-quinoline.

W. F.

HUGHES (T. A.) & SHRIVASTAVA (D. L.). **Observations on Anaemia in Patients with Enlarged Malarial Spleens.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 565-584. With 3 text figs. [9 refs.] [King Edward Med. College, Lahore.]

"In the production of anaemia in certain patients whose spleens have become enlarged as a result of chronic malaria causes other than

the direct destruction of red blood cells by the parasites, but nevertheless connected with malaria, would seem to be operative." This paper is based on a study of anaemia in 31 chronic malarial patients with splenomegaly who showed little or no signs of active malarial infection. As the result of their investigations, the authors suggest that, in the milder cases, the anaemia is due to destruction of the red cells by the reticulo-endothelial cells of the enlarged spleen (and possibly of other organs), facilitated in some instances by abnormal fragility of the corpuscles. In severe cases, there were in addition signs of derangement of the function of the bone-marrow. Four severe cases were treated with liver and iron, with the result that improvement took place in three. In the fourth, neither red cells nor haemoglobin increased, and it appeared from the estimations of the bilirubin in the plasma that the destruction of the corpuscles was keeping pace with their increased production.

W. F.

MARTINI (E.). Zwei Malariafälle. Langfristige Inkubation und langfristiges Rezidiv. [**Two Cases of Malaria. Long Incubation Period and Long Delayed Relapse.**].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Oct. Vol. 35. No. 10. pp. 577-583. [15 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The female assistant of the author was bitten by *A. maculipennis*, which were infected with *P. vivax*, on June 1st 1927 at Hamburg. She remained well till May 29th 1928, when she had a rigor with high fever. There was no possibility of infection with malaria in the interval. Blood examination showed parasites (*P. vivax*) with many gametocytes. She was treated with plasmoquine and recovered rapidly. The author himself, whilst engaged in studying mosquitoes in the Pontine marshes, was bitten by them on July 21st and 23rd 1930, and at Gorino on July 27th. He felt ill on August 4-5th, and on August 6-7th had slight shivering. Examination of his blood on August 7th and 8th gave negative results. On August 9th, quinine was commenced and continued till August 18th. There was nothing noteworthy till June 12th 1931, when he had a rigor, but continued work. On June 13th rings and gametocytes of *P. falciparum* were found in thick films of his blood. On the 14th he had a typical attack of malaria. On 15th quinoplasmine was commenced and continued for 3 weeks. He had no further attacks. In his discussion of the question of relapse he refers to the work of JAMES. He considers that spring relapses after the primary infection in autumn are influenced considerably by meteorological conditions as to whether they occur late or early in spring.

E. D. W. Greig.

BUTLER (G. G.). **Malaria in Parturient Women.**—*Gold Coast Rep. of Laboratory Services Year 1929-1930.* Appendix C. pp. 31-33.

Blood-smears from the finger and from the placenta were examined in 328 confinements. Subtertian parasites were found in both placenta and peripheral blood in 53; in the placenta only, in 23; in the peripheral blood only, in 6. The parasites in the placenta comprised sporulating, and stumpy or solid forms; rings were rare, and crescents

were absent. Taking pigment and parasites together, there was evidence of malaria in about 40 per cent. of the placentas. Ninety per cent. of the women with healthy placentas went to full term, but only 70 per cent. of those with infected placentas. Blood from the umbilical cord was examined in 50 cases but parasites were found in only one, and in that case the technique was probably faulty. It is possible that an infant born with an infected placenta may be passively immunized by it. "Infection must be so universal that it can scarcely be affecting the people or the race would be dying out, or have died out, long ago."

W. F.

LOMBART (H.). La malaria congenitale chez les noirs d'Elisabethville. [**Congenital Malaria among the Natives of Elisabethville.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 315-319. [4 refs.] [Govt. Lab., Elisabethville.]

Blood films were made from the peripheral blood of 50 parturient women and from the placenta and cord in each case; also from the infants at birth and on the five following days. Fifty-six per cent. of the mothers had parasites, though these had no apparent ill effect upon their health. Parasites, especially dividing forms, were found in 50 per cent. of the placentas. Blood from the cords contained parasites in only one case. The films taken from the infants were all negative.

W. F.

YORKE (Warrington) & MURGATROYD (Frederick). **Malaria in Pregnancy.**—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 551-553.

A patient from West Africa who was 7 months pregnant, had a moderate subtertian infection. She was given 15 grains of quinine daily for 9 days, and parasites disappeared. Subsequently she was given 15 grains every Saturday and Sunday, up to full term and, during that period, she had several mild relapses. Sections of the placenta showed massive infection of the maternal sinuses, but the blood in the foetal vessels of the chorionic villi was free from infection, and the child was healthy.

W. F.

THOMAS (G. C.) & RIDOUT (G. B.). **Anaphylactic Shock accompanying Benign Tertian Malaria.**—*U.S. Nav. Med. Bull.* 1931. July. Vol. 29. No. 3. pp. 470-472.

A young seaman had a rigor followed by fever, and a sudden anaphylactic reaction with giant urticarial wheals covering the entire body and extremities, and considerable oedema of the glottis. His pulse was 140 and very weak. Benign tertian parasites were found in his blood, he was given quinine and on the following day he felt very well. On the third day he had another paroxysm of malaria, and the anaphylactic symptoms returned. Temperature 106° F., pulse 160 and very weak, lungs filled with moist rales, breathing dyspnoeic. The response to adrenalin was rapid. Subsequently he had no more paroxysms and no more anaphylactic symptoms. There was no history of asthma or hay-fever in himself or his family.

W. F.

HÉDERER. Trois cas d'anémie paludéenne traités par l'opothérapie splénique. [**Three Cases of Malaria treated with Injections of Spleen Extract.**].—*Arch. Méd. et Pharm. Nav.* 1931. Apr.-May-June. Vol. 121. No. 2. pp. 210-225. [5 refs.]

The researches of the Toulouse school have demonstrated the important part played in the process of blood regeneration by insaponifiable lipoids extracted from the spleen. Details are given of three cases of severe malarial anaemia, selected from a number treated by the author with intramuscular injections of an ampoule of "liposplénine" every other day; quinine and blood transfusion were employed when necessary. The results of the treatment were a remarkable increase in the number of the blood cells, a progressive lessening of the splenomegaly, an increase of weight, and a great amelioration of the general condition.

W. F.

ADAMS (Jas. M.). **The Standard Treatment of Malaria. (A Preliminary Report.)**—*New Orleans Med. & Surg. Jl.* 1931. Nov. Vol. 84. No. 5. pp. 379-384. [12 refs.]

This was the subject of a paper read before the Louisiana State Medical Society. Bass's standard treatment consists of 10 grains of quinine sulphate, three times a day, for three days, or until the clinical symptoms have subsided; and, 10 grains every night, for a minimum period of 8 weeks. BETHEA has suggested that the dose should be modified according to the patient's weight, 1 grain being given daily for each 5 pounds of body weight until the fever ceases, and then, 1 grain nightly for every 15 pounds during the next 8 weeks.

The author treated 1,562 cases as out-patients. Patients with benign tertian were given 99 grains of quinine to take home, and were instructed to swallow 10 grains three times a day. Quartan patients were given 120 grains; subtertian cases were very rare. They were told to return when the quinine was finished, and they were then given sufficient to complete the treatment of 10 grains every night for 8 weeks. The drug was given in the tablet form.

The results were good, and there were 90 per cent. of apparent cures. In the discussion which followed, Dr. BETHEA said that the 10 per cent. uncured probably consisted of people who had not taken the quinine which had been supplied to them. Dr. C. C. BASS agreed; he said that he had tried to find some of the so-called quinine-fast cases, but without success.

W. F.

PIRAMI (Ester). Chinostovarsol e Malaria. [**Quiniostovarsol in Malaria.**].—*Arch. Ital. Sci. Med. Colon.* 1931. Dec. 1. Vol. 12. No. 12. pp. 714-729. English summary (7 lines). [Inst. of Colonial Path., Univ., Modena.]

Quiniostovarsol, the oxyacetylaminophenylarsenate of quinine, as prepared at the National Institute of Chemotherapy contains 50 per cent. stovarsol. Three methods of administration are recommended: 1. For prevention, one tablet of 0.25 gm. daily before food; 2. For continued treatment, two tablets night and morning till the symptoms disappear; 3. Intermittent treatment, four tablets daily for 3 or 4 periods of 10 days, with intervals of 5 days.

The author reports the results in 25 patients, 14 with benign tertian, 3 quartan, 8 subtertian. He used the third method but modified it

by giving 3 tablets to adults and correspondingly less to children ; one in each group had 4, and one with more serious symptoms and daily fever had five. Though notes of each patient are given, the dates of disappearance of the parasites cannot be stated as the patients were not under daily supervision. The results were very good on the whole. Two of the benign tertians relapsed later, as did two of the subtertians ; in two others of the latter the result is uncertain as the patients left the district. Apart from disappearance of parasites from the blood, the splenic enlargements soon became reduced and improvement in the general well-being was marked.

H. H. S.

DECOURT (Philippe). Traitement des paludismes anciens par spléno-contractions adrénaliniques répétées. [**Treatment of Relapsing Malaria by Splenic Contractions induced by Adrenalin.**].—*Rev. Méd. et Hyg. Trop.* 1931. July-Aug. Vol. 23. No. 4. pp. 231-232.

The author comments on the difficulty of curing chronic relapsing malaria when the parasites lie hid in the spleen where no drug can reach them. His plan is to carry out a six days' treatment with quinine and arsenic, and at the same time to give injections of 1 to 2 cc. of adrenalin (1 in 100 solution) every morning, with the object of producing splenic contractions and so driving the parasites into the blood-stream where the quinine can get at them.

W. F.

DAWSON (W. T.) & NEWMAN (S. P.). **Acquired Allergic Coryzal Reaction to Quinine but not to Quinidine or Quitenine.**—*Jl. Amer. Med. Assoc.* 1931. Sept. 26. Vol. 97. No. 13. p. 930. [10 refs.] [Med. School, Univ. of Texas, Galveston, Texas.]

The subject, a man of 24, had repeatedly taken quinine when a child without ill effect, but between the ages of 16 and 23 he became hypersensitive. About an hour after swallowing a couple of grains of quinine hydrochloride, the eyes and nose began to itch and run. The skin test was not positive. Quinidine and quitenine (a possible hepatic oxidation product of quinine, probably useless in malaria) produced no reaction when given by the mouth. The subject's brother, with a similar history of earlier tolerance of quinine, developed an urticarial reaction to the drug.

W. F.

SANDERS (J. P.). **Treatment with Malaria and Acquired Anaphylactoid Reaction to Quinine : Successful Use of Quinidine.**—*Jl. Amer. Med. Assoc.* 1931. Sept. 19. Vol. 97. No. 12. pp. 850-851. [2 refs.]

A woman of 47 who had been treated with quinine when a child of 8, later became intolerant. When she was 20, the drug produced severe reactions in about 15 minutes, with urticaria, dyspnoea and vomiting. When she was 45, an eighth of a grain had the same effect. The skin test was positive with quinine, but negative with its dextrorotatory isomer quinidine. The latter drug was therefore administered as a remedy for the chronic malaria from which she was suffering, with the result that the parasites disappeared and there was no reaction. Her son had an attack of urticaria on the one occasion on which he was given quinine, but the skin test was negative in this case. The patient could take plasmoquine without a reaction.

(See DAWSON and GARBADE, this *Bulletin*, 1931, Vol. 28, p. 62.)

W. F.

SCHULEMANN (Werner), SCHÖNHÖFER (Fritz) & WINGLER (August). Synthese des Plasmochin. [**Synthesis of Plasmoquine.**—*Klin. Woch.* 1932. Feb. 27. Vol. 11. No. 9. pp. 381-384. [29 refs.]

This is a highly technical paper dealing with the work of the authors on the chemistry of plasmoquine. Chemical formulae are given to illustrate the method of building up plasmoquine and the chemical structure of the latter is contrasted with that of quinine. The paper should be consulted in original by chemists and others interested.

E. D. W. Greig.

ROSKIN (Gr.) & ROMANOWA (K.). Arzneimittel und ultraviolette Strahlen. X. Mitteilung. Bestrahltes Chinin bei Vogel malaria. [**Irradiated Quinine in the Treatment of Bird Malaria.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 72. No. 5/6. pp. 445-449. [1 ref.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

The authors' results are incorporated in two tables; they reach the following conclusion: that in the treatment of experimental bird malaria a preliminary irradiation of the quinine solution with ultra violet rays produces a distinctly higher therapeutic activity than that of untreated quinine in the same doses. The exact nature of the chemical change in the quinine will form the subject of a further research.

E. D. W. Greig.

ANDREWS (Justin). "**Zebe-à-pique**" as a Malariacide in Grenada, B.W.I.—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 411-412. [Johns Hopkins School of Hyg. & Public Health, Baltimore.]

In the course of a malaria survey of Grenada, B.W.I., the author tested the reputed antimalarial action of *zebe-à-pique* or the Bastard Cedar Bush (*Parphenium hysterophorus* Grisabach). Extracts of the leaves in alcohol and in water were administered to six malarial (subtertian) subjects while other six received quinine. The effect of *zebe-à-pique* as regards both fever and presence of parasites was nil.

A. G. B.

RUSSELL (Paul F.). **Avian Malaria Studies. I-III.**—*Philippine Jl. Sci.* 1931. Vol. 46. pp. 305-345; 347-361; 651-679.

i. **Prophylactic Plasmochin in Inoculated Avian Malaria.** pp. 305-345. With 20 text figs. [196 refs.]

"Three experiments are reported in which canaries were given intramuscular injections of . . . saline and blood containing *Plasmodium cathemerium* on the third day of a week during which they received daily doses of plasmochin simplex intramuscularly. In no case was it possible to detect an infection in these birds, although in every case control birds that had not received plasmochin developed typical avian malaria."

ii. **Prophylactic Plasmochin versus Prophylactic Quinine in Inoculated Avian Malaria.** pp. 347-361. With 7 text figs. [4 refs.]

One lot of birds was given daily injections of plasmoquine for a week, and a second lot was given quinine. They were inoculated with blood containing *P. cathemerium* on the 3rd, 4th, 5th, 6th and 7th days. Those in the plasmoquine series which were inoculated before the end of the week were all protected, but the birds inoculated on the seventh day, five hours after their last dose, became infected, as did all the birds in the quinine series.

iii. **The Experimental Epidemiology of Avian Malaria : Introductory Paper.** pp. 651-679. With 3 text figs. and 3 figs. on 2 plates. [160 refs.]

This paper describes introductory experiments on the epidemiology of malaria (*P. cathemerium*) among a population of canaries, where the vectors were *Culex pipiens* or *C. quinquefasciatus* (*C. fatigans*). The mosquitoes were bred in special cages; the larvae being fed on Löffler's dehydrated blood serum mixed with litmus milk, and the adult males on raisins in sugar syrup. The number of mosquitoes was counted daily, and the spread of infection was studied under controlled conditions among canaries introduced into the cages, the proportion of gametocyte carriers (after inoculation) among the canaries introduced being different in different cages.

W. F.

MILANI (C.) & CUBONI (E.). Inoculation de la malaria chez l'homme et immunité antimalarique. [**Inoculated Malaria and Immunity.**]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia*. Milan. 1931. Sept. Vol. 3. No. 9. pp. 521-527. With 3 text figs. [1 ref.]

Among 145 patients inoculated with strains of *Plasmodium vivax*, 3, or 2.06 per cent., resisted infection, although they had never had malaria. (See S. P. JAMES, this *Bulletin*, Vol. 28, 1931, p. 567.) In addition, among 134 patients with no history of malaria, 14, or 10.44 per cent., recovered spontaneously before the occurrence of the twelfth paroxysm. The authors consider that some individuals possess a natural resistance to malaria, perhaps for only a period of life, which may be congenital. In patients with a history of malaria, there was a greater tendency to spontaneous cure; in fact all the 8 who were inoculated recovered without treatment—3 after five paroxysms, 3 after four, and 2 after two. Inoculation malaria, like the naturally acquired disease, produces a relative immunity. In 56 re-inoculations, subsequent to previous successful inoculation, 59 per cent. failed, and of those which "took" 95 per cent. recovered spontaneously. The immunity increases with successive re-inoculations; the greater the number of inoculations the smaller is the chance of being able to re-infect. The resistance to infection does not appear to be influenced by the state of health of the patient, nor does it make any difference whether he is suffering from G.P.I. or some other nervous disease. The proportion of spontaneous recoveries is influenced by the season during which the inoculation is made: in spring and winter the number of such recoveries is 15 to 20 per cent. higher than in summer and autumn.

W. F.

CIUCA, BALTEANU (I.) & BALLIF (L.). Contributions à l'étude du traitement abortif de l'infection paludéenne intentionnellement provoquée par inoculation de sang virulent de Laverania. [**Abortive Treatment of Malaria produced by Inoculation of Infective Subtertian Blood.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 645-649. [Hyg. Inst. & Centre of Local Malaria Therapy, Jassy.]

Commencing a few days after they had been inoculated with subtertian-infected blood, a number of paralytics were treated with

various antimalarial drugs during the incubation period of the malaria, and this treatment was continued for about three weeks. Four were given plasmoquine, 5 quinoplasmine, 8 quinio-stovarsol, 3 quinine. They were kept under observation for six months; none of them developed malaria and none showed parasites in the blood with the exception of one of the cases treated with quiniostovarsol, in which crescents were found. The blood of this man was inoculated into other patients, but without result for the crescents were unable to produce infection.

W. F.

WOLTER (A.). Ueber die Schnellldiagnose der Malaria mit Hilfe des Dunkelfeldes. [**Dark Ground Illumination for Rapid Diagnosis of Malaria.**]—*Dermat. Ztschr.* 1932. Jan. Vol. 63. No. 1-2. pp. 69-72. With 2 figs. [7 refs.] [Univ. Skin Clinic, Bonn.]

The author strongly recommends dark ground illumination for the detection of malarial parasites in blood films. He states that the parasites, including the youngest forms, are easily and quickly found; the pigment of the parasite stands out brightly against the black background. The examination of vitally stained blood films with dark ground illumination is recommended also since very beautiful preparations are got by this method.

E. D. W. Greig.

DENES (G.). Recherche du parasite malarique dans le sang veineux. [**Examination of Venous Blood for Malaria Parasites.**]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1931. Oct. Vol. 3. No. 10. pp. 662-663. [Provincial Lab. of Hyg. & Prophylaxis, Padua.]

Instead of a few drops of blood for serological tests and some badly-made films for microscopical examination, it is far better to have 5-10 cc. of blood sent to the laboratory in a test tube. The serum is pipetted off for agglutination tests, cultures are made from the clot, the bloody serum at the bottom of the tube is centrifuged and the deposit is used for making blood films. The parasites are well preserved and, in subtertian, there is a concentration of parasites at the bottom of the tube, owing to the increased specific gravity of the infected corpuscles.

W. F.

THOMSON (J. G.). **Some Observations on the Nuclear Structure of the Malignant Tertian Malarial Parasite (*Plasmodium falciparum*).**—*Jl. Trop. Med. & Hyg.* 1932. Jan. 1. Vol. 35. No. 1. pp. 1-4. With 22 figs. on 1 plate. [3 refs.]

Ordinary, dry-fixed blood-films do not give a true picture of nuclear structure, and the author has therefore studied it in sections and wet-fixed films. The most useful stain for sections is Heidenhain's, used after removal of all pigment with acid alcohol. Parasites in sections shrink during the fixing process and are far smaller than those in dry-fixed films where they are flattened and stretched out. A series of excellent drawings, to which the reader should refer, accompanies this paper. (See also SINTON and MULLIGAN, this *Bulletin*, 1931, Vol. 28, p. 146.)

W. F.

TSCHILOW (K.). Untersuchungen ueber das Koagulationsband nach Weltmann unter besonderer Berücksichtigung der Malaria. [**Investigations on the Coagulation Band with Special Reference to Malaria.**]—*Wien. Klin. Woch.* 1931. Sept. 11. Vol. 44. No. 37. pp. 1164–1166. [2 refs.] [Therap. Clinic, Univ., Sofia.]

Using the method of Weltmann*, the author studied 46 cases of malaria, benign and malignant tertian as well as mixed infections. He finds that in malaria the coagulation band (K.B.) is lengthened, namely, to 8 and 9 tubes in place of the 6 and 7 of normal sera. He considers the reaction to be a non-specific one like blood corpuscle sedimentation.

E. D. W. Greig.

LE BOURDELLE (B.) & VELLUZ (L.). Malaria-floculation de Henry et protéines du sérum palustre. [**The Blood Proteins and Henry's Reaction in Malaria.**]—*C.R. Soc. Biol.* 1931. Oct. 23. Vol. 108. No. 29. pp. 402–403. [2 refs.]

Henry's reaction, with ox eye pigment and ferrous salts employed as substitution antigens in place of true malaria products, resembles Wassermann's reaction with its substituted antigen of lipoids. Is it purely a physicochemical reaction? The authors examined the sera of 9 patients which gave strong positive Henry's reactions, and found that the total protein content, the albuminglobulin ratio, and the blood cholesterol, were all within normal limits. These results, he concludes, are in favour of the biological, as opposed to the physical, conception of the reaction.

W. F.

JERMOLJEW (Z. W.) & BUJANOWSKAJA (I. S.). Zur Frage der Malaria-Immunität. [**On Immunity in Malaria.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 73. No. 3/4. pp. 276–278. [Biochem. Inst., Public Health Commissariat, Moscow.]

The problem which the authors sought to solve was: whether in malaria there is a true immunity or only an "infection immunity," which is associated with the presence of the plasmodium in the organism. They attacked the problem by experiments with malaria in canaries. It was attempted to produce artificial immunity by plasmodia killed in various ways. They conclude that: (1) In malaria there is no sterilizing immunity, but an "infection immunity," that is, a latent infection which produces a resistance to reinfection; (2) By the introduction of various forms of killed plasmodia an artificial immunity was not obtained. (3) Treatment of malaria with various forms of killed plasmodia was valueless.

E. D. W. Greig.

* WELTMANN has described a method by which the coagulability of serum albumin can be followed in a graduated series of calcium chloride concentrations. Normal sera show a close approximation in their coagulation behaviour, the coagulation band (K.B.) extends from a calcium concentration of 0.5 to 0.4 per cent., that is, 6 or 7 tubes. In some diseases there is definite shortening, in others a definite lengthening of the K.B.

SWELLENGREBEL (N. H.) & DE BUCK (A.). **Prophylactic Use of Plasmoquine in a Dosage warranting Reasonable Safety for Routine Treatment.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam*. 1931. Vol. 34. No. 8. pp. 1216–1220. With 1 chart in text. [10 refs.] [Royal Colonial Inst., Amsterdam.]

JAMES, NICOL and SHUTE (this *Bulletin*, Vol. 28, p. 973) have prevented malaria in persons subjected to the bites of heavily infected mosquitoes by means of a daily dosage of 6 centigrams of plasmoquine pure, given on the evening preceding infection, on the day of infection, and on the 5 succeeding days. The authors repeated this experiment, using *A. maculipennis* heavily infected with Colonel JAMES's Madagascar strain of *P. vivax*. Six centigrams a day is a dangerously high dose, consequently they gave 3 centigrams instead. This amount proved ineffective, nearly all the volunteers came down with fever three or four days after it was stopped. The authors however, say that their "subjects were bitten by numerous, heavily infected mosquitoes. It is quite likely that the chances of success would have been far better in the field than in our laboratory."

W. F.

JAMES (S. P.). **The Use of Plasmoquine in the Prevention of Malarial Infections.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam*. 1931. Vol. 34. No. 10. pp. 1424–1425.

Referring to SWELLENGREBEL's paper, Colonel James suggests that the sporozoites of malaria, instead of entering the blood corpuscles, may undergo schizogony in the reticulo-endothelial cells like the sporozoites of "halteridium" in pigeons, and that plasmoquine may not act upon the sporozoites themselves, but upon the merozoites resulting from their schizogony. The results of his later experiments support this view. "Perhaps that may be the reason why it is necessary in order to obtain successful prophylactic results with smaller doses of plasmoquine than 6 cg. daily, to begin the administration some days before infection and to prolong it for more than five days thereafter." Experiments are proceeding to determine the smallest daily dose which will prevent infection and in these the drug is begun a week before exposure to infection, and continued for ten days after.

W. F.

JAMES (S. P.). La chimio-prophylaxie de la malaria. [**The Chemo-Prophylaxis of Malaria.**]—*Bull. Office Internat. d'Hyg. Publique*. 1931. Dec. Vol. 23. No. 12. pp. 2175–2178. [2 refs.]

This report is based upon the experiments of the author and his colleagues with plasmoquine in the prophylaxis of malaria [this *Bulletin*, Vol. 28, p. 973]. Quinine, and other cinchona derivatives, have an unfailing action on the asexual phase of the parasite which causes the symptoms of malaria, but they leave the sporozoites injected by the mosquito and the crescents untouched. Plasmoquine on the contrary has little action on the asexual forms of malignant tertian, but it destroys the crescents and the sporozoites, and thus has power to prevent the infection of both man and mosquito. It will therefore be of great value as a prophylactic in ships touching at malarious ports, for troops passing through malarious country, for explorers and the like.

W. F.

CLEMESHA (Wm. Wesley). **Further Note on Anti-malarial Measures on the Travancore Tea Companies' Estates.**—*Indian Med. Gaz.* 1931. Nov. Vol. 66. No. 11. pp. 618-622. [1 ref.]

The author reports the continued success of plasmoquine with quinine in a labour force under complete disciplinary control. (This *Bulletin*, 1931, Vol. 28, p. 576.) Up to the end of June 1929, there was much sickness from malaria; in spite of antilarval measures it was never less than 30 per cent. Plasmoquine anti-gametocyte after-treatment was started in the autumn of 1928, and the rate dropped to 10 per cent. per annum. In 1931 it dropped still further, to under 3 per cent. in three out of the author's five estates. "This rapid decline from 30 to 3 in two years cannot be accounted for by the antilarval measures alone, though, of course, they have had an influence."

W. F.

i. WATSON (Malcolm); ii. CLEMESHA (W. W.). **Prophylactic Plasmoquine on a Tea Estate.** [Correspondence.]—*Lancet.* 1931. Dec. 26. pp. 1432-1433; 1932. Apr. 2. p. 750.

i. The writer criticizes the above report by Col. CLEMESHA, and also a previous one, concerning the same group of estates, by CLEMESHA and MOORE (this *Bulletin*, 1931, Vol. 28, p. 576). He is of opinion that there are regions where drugs should be used to supplement antilarval measures, and that, in some, treatment with drugs is the method of choice, but he considers that Col. CLEMESHA's reports are so misleading that they do not help us to get nearer to the truth about the value or limitations of either plasmoquine or antilarval measures. He visited these tea estates in April 1929, and found that, on some of them, the antilarval work was very inefficient; he therefore recommended that thorough measures should be undertaken over an area of a quarter mile radius around each centre, this area being extended if necessary. The improvement in health which followed was the result of the better organization of the antilarval work and not the result of plasmoquine. The report of CLEMESHA and MOORE, and the note above by CLEMESHA "contain statements which . . . are not true in fact; and they omit information without which it is impossible to estimate the relative value of the various factors which led to the improved health of the estates."

ii. In reply, Colonel Clemesha states that Sir Malcolm WATSON spent only five or six days on these estates, and that he did not appear to consider the oiling of such very great importance at the time for, in answer to a request for a copy of his report, he wrote "I have not made any written report. I think my only recommendations were that a definite area of a quarter of a mile round the lines should be selected and controlled . . . and . . . on one of the estates some land should be acquired from the Government to complete the control work." The area oiled was only increased in two estates, yet all showed improvement in the health figures, and Colonel Clemesha states that these two estates can be omitted from the calculations without upsetting his conclusions. He asks Sir Malcolm WATSON "What was the cause of the complete breakdown of his oiling measures on the estates in the Federated Malay States in 1926?"

W. F.

KINGSBURY (A. Neave) & AMIES (C. Russell). **A Field Experiment on the Value of Plasmoquine in the Prophylaxis of Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 159–172. With 2 figs. [6 refs.] [Inst. for Med. Research, Kuala Lumpur.]

[It has been shown that the viability of gametocytes can be destroyed by minute doses of plasmoquine, and that patients can thus be rendered non-infective to mosquitoes; but the elimination of malaria in any community by this method depends on the extent to which that community is under control (see this *Bulletin*, BARBER, 1929, Vol. 26, p. 939; WHITMORE, 1931, Vol. 28, p. 107; AMIES, *ibid.* p. 599; also CLEMESHA, *ibid.*, p. 576).]

"1. Plasmoquine was given in an adult dose of 0.04 grammes (0.9 mg. per kilogram body weight) twice weekly to a population of about 330 on a Rubber Estate where the incidence of malaria had been high for many years.

"2. At regular intervals of three months surveys were carried out to determine the malaria parasite rate (thick film method), the spleen rate, and the average haemoglobin value of the population on this Experimental Estate. Surveys of anopheline breeding places were also carried out at the same time.

"3. Similar surveys were carried out at the same times on two contiguous Control Estates with populations of 405 and 362.

"4. The experiment was continued for a period of twelve months.

"5. The effect of plasmoquine prophylaxis on the incidence of clinical malaria was marked. In the year preceding the experiment the subtertian and benign tertian cases numbered respectively 30.4 and 52.5 per cent. of the population. Throughout the experimental period of twelve months, the incidence was 7.0 and 8.7 per cent. for subtertian and benign tertian infections respectively.

"6. From the parasite rates alone, the results were somewhat inconclusive, since the Control Estates showed a fall in the number of blood infections equal to that found on the Experimental Estate. Towards the end of the experiment, no *P. falciparum* gametocyte carriers could be found on the Experimental Estate.

"7. From the parasite rates only, it appears that the method was perhaps less satisfactory for benign tertian than for sub-tertian infections. This may possibly be due to plasmoquine having a less marked gametocidal action on *P. vivax*.

"8. There was slight improvement in the splenic index and in the average haemoglobin percentage, but the improvement in the general physical condition of the labourer was most satisfactory. This observation was confirmed by the sickness rate which fell by 51 per cent. on the Experimental Estate, as compared with the previous year. On Control Estate I, the sick rate fell by 11 per cent. during the same period, but there was an increase of 21 per cent. in the sick rate on Control Estate II.

"9. The cost of this method of prophylaxis is about \$600 (Straits Settlements) or £70 per annum per 100 labourers, including treatment of the average number of dependents."

W. F.

DE MELLO (Froilano) & BRAS DE SA. La plasmoquination en masse des localités malariennes et ses résultats prophylactiques. [**Prophylactic Plasmoquine in Malarious Places.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 649–656. [7 refs.]

The isolated village of Codal was selected for this experiment. It was highly malarious; the splenic index was 82.7 per cent., and the

population was untreated. Antilarval treatment of mosquito breeding places with Paris green was carried out for three weeks, and mosquito traps were put in the houses and stables. The Paris green was then discontinued. The inhabitants were treated for about four weeks—with appropriate intervals of rest—with 0.03 gram of plasmoquine and 0.5 grams of quinine daily. Subsequently they were given one day's treatment every week, and this supplementary treatment was continued for 2½ months unaccompanied by any antilarval work. The results were most encouraging; the splenic index fell from 82.7 to 27.2 and, instead of half the population being incapacitated with fever, there was scarcely a case to be found although the disease was as bad as ever in the surrounding villages. Subsequently there was a large influx of labourers from malarious districts which was soon followed by fresh cases among the inhabitants, and the authors point out that if mass prophylactic treatment is to be a success, one must have power to examine, and to treat if necessary, all new-comers to a district.

W. F.

KLIGLER (I. J.) & MER (G.). **Periodic Intermittent Treatment with Chinoplasmine as a Measure of Malaria Control in a Hyperendemic Area.**—*Riv. di Malarologia*. 1931. July-Aug. Vol. 10. No. 4. pp. 425-438. With 1 chart in text. [4 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

About 900 persons, the inhabitants of five villages near an *A. elutus* breeding area, were treated with "chinoplasmine," consisting of 0.9 grams of quinine and 0.03 grams of plasmoquine daily, with proportionately lower doses for children. Three five-day courses were given at intervals of two weeks. "Both the incidence of human and mosquito infection was reduced to about one-third of that normal for the area. . . . The mixture was far less efficacious in children below 4 years. . . . While the immediate effect of the treatment was good, a considerable number of cases relapsed within two weeks. . . . Repeated treatment tends to increase the resistance of the parasites to the drug."

W. F.

KAISER (L.). Chinine- en Chinoplasminprophylaxis. [**Quinine and Quinoplasmine Prophylaxis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Nov. 15. Vol. 71. No. 16. pp. 1355-1357.

The same military patrol visited a malarious part of South Celebes on three occasions. On the first occasion quinine was administered prophylactically, but notwithstanding, 11 out of 21 men got malaria. On the two other occasions quinoplasmine only was given once and the other time quinine to one half of the men and quinoplasmine to the other half. On the last occasion one case of tertian fever (relapse) occurred. The author appears very satisfied about these results and about the absence of by-effects during the use of quinoplasmine, which therefore does not interfere with the military value of the patrol.

[Yet the superiority of quinoplasmine over quinine in this respect is by no means proven, as on the first occasion the last dose of quinine (0.6 gm. of the hydrochlorate) before the outbreak of the disease was administered the day after the patrol left the highest infected spot, i.e. probably in the early beginning of the incubation period.]

W. J. Bais.

"Greenglide" (Reg. No. 523450) Floatable Paris Green in Malaria Control.—1931. Dec. Bull. No. 316. 2 pp. Issued by W. J. Craven & Co. Ltd., Manufacturing Horticultural Chemists, Evesham. In Association with Hoyle, Robson, Barnett & Co., Ltd., Newcastle-on-Tyne.

The above firm of horticultural chemists, at Evesham, have issued a pamphlet describing a form of Paris green which they have put on the market under the name of "Greenglide." The great advantage which it is said to possess over ordinary Paris green is that it will float for weeks. "It answers to the following specification:—

Arsenious oxide As_2O_3 ,	55.37 per cent.
Copper oxide CuO	31.12 "
Water soluble arsenic (Max.)	1.0 "

The actual cost of Greenglide is in line with the price charged for the ordinary commercial Paris green." A second pamphlet illustrates the different types of blower recommended for use with "Greenglide."

W. F.

SYMES (C. B.). Observation on Anopheelines and Malaria in Kitale, with Notes on Experimental Control with Paris Green.—*Kenya & East African Med. Jl.* 1931. Dec. & 1932. Jan. Vol. 8. Nos. 9 & 10. pp. 256-267; 280-283. [2 refs.]

In 1929, at the suggestion of Lt.-Col. S. P. JAMES, it was decided to experiment with Paris green as a substitute for oiling. Kitale was chosen as a suitable area; its long stretches of jungle-covered streams, which could not be effectively treated with oil, provided excellent testing grounds. The principal carriers are *A. costalis* and *A. funestus*; the anopheline season coincides with the long wet season. The diluting powder was dust from the Elgon caves. Paris green was cheaper than oiling, but, though the experiment had promising results, it proved by no means a satisfactory method of control in Kitale.

W. F.

MARTINI (E.). Das Bestäubungs-, besonders Schweinfurtergrün-Verfahren in der Malariabekämpfung. [Paris Green as an Anti-Malarial Measure.]—Reprinted from *Ztschr. f. Desinfektions- u. Gendhtwesen.* 1931. No. 4. pp. 151-166. [52 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

A useful survey of the literature of the subject.

E. D. W. Greig.

KANDELAKI (S.). Splenographie und Milzindex ("Splenometrie"). [Splenometry.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Feb. Vol. 36. No. 2. pp. 74-77. With 6 text figs. [Trop. Inst. of Georgia, Tiflis.]

The author describes his method of estimating the spleen index. No reference is made to the important work of Christophers on measurements of size of spleen; no corrections are given for sitting height, nipple-umbilicus line or age.

E. D. W. Greig.

MALARIA (CORRESPONDENCE)

NIEUWENHUIS (A W) Die Entstehung der Polynesier und ihrer Kultur Der Einfluss endemischer Malaria in Ozeanien [**Influence of Endemic Malaria in Oceania.**].—*Acta Leidensia* (Scholae Med Iropicae). 1930 Vol 5. pp 128-192

Dr P A BUXTON after perusal of the summary of this paper published in this *Bulletin*, Vol 28, p 986 writes to ask whether it is clear in the original paper that there is no malaria in Polynesia Colonel GRIGG (the reviewer) has replied that this is clear, and that the author, in dealing with the influence of endemic malaria in Oceania, compares the culture of the malaria-free Polynesian with that of his neighbours in those parts of the South Sea where malaria is found

- ASSELIN Sur un cas de paludisme autochtone observé dans le centre urbain de Hanoi.—*Bull Soc Méd Chirurg Indochine* 1931 Oct Vol 9 No 9 pp 733-734
- BARRETO (Castro) Indice endemico da malaria na zona de Curumarim (D Federal).—*Brasil Medico* 1932 Jan 9 Vol 46 No 2. pp 33-34 [2 refs]
- V BERKESY (L) Über die Entstehung der Malariainfektionen in Vorführung Erwiderung auf obige Bemerkungen von Herrn F. Fischl zu der gleichnamigen Mitteilung in Nr 35 der Zeitschrift.—*Wien Klin Woch* 1932 Feb 12 Vol 45 No 7 pp 209-210
- BIGGAM (A G) Malaria and its Treatment.—*Jl Roy Army Med Corps* 1931 Oct Vol 57 No 4 pp 283-290 With 2 text figs
- BONAIBERTI (E) Contributo allo studio della reazione di Henry nella diagnosi clinica di malaria.—*Boll Istituto Sieroterap Milanese* 1931 Nov Vol 10 No 11 pp 711-719 [7 refs] English summary [Provincial Lab of Hyg & Prophylaxis, Ferrara]
- BORDES (L A) & NGUYEN VAN-LIENG Note sur les albumines et la cholestérine du serum sanguin chez les paludeens chroniques de race annamite.—*Bull Soc Path Exot* 1931 Oct 14 Vol 24 No 8 pp 724-731 [18 refs] [Pasteur Inst Saigon]
- BOURGUIGNON (G C) & PEEL (E) Note préliminaire relative à l'administration de plasmoquine associée à la quinine en vue de l'assainissement des régions impaludées de terre tropicale.—*Ann. Soc Belge de Méd Irop* 1931 Aug 31 Vol 11 No 3 pp 257-274
- CAMPUNAUD Au sujet de quelques cas de paludisme autochtone constatés à Hanoi.—*Bull Soc Méd.-Chirurg Indochine* 1931 Oct Vol 9 No 9 pp 735-738
- CARDAMATIS (J P) A propos des nouvelles théories sur le paludisme (On New Theories on Malaria).—*Riv di Malarologia* 1931 May-June Vol 10 No 3 pp 311-320 English summary p 420 [School of Malariology Athens]
- CHUKERBUTI (J C) Cross Fertilization among Malarial Parasites.—Reprinted from *Antiseptic* 1931 Sept Vol 28 3 pp With 1 text fig [Indian Milit Hosp, Trimulgherry]
- CONSOLI (Nicolò) Gli interventi di piccola bonifica nella lotta antimalarica in Sicilia L'azione spiegata dal Provveditorato alle Opere Pubbliche dall'anno 1926 all'anno 1930.—II Relazione.—*Riv Sanitaria Siciliana* 1931 Sept 15 Vol 19 No 18 pp. 1303-1359 With 34 figs and 2 graphs.
- COULON (G) & SAUTET (J) Diverses formes du paludisme en Corse Apparition des gamètes.—*Bull Soc Path Exot* 1931 Nov 12 Vol 24 No 9 pp 811-817 With 1 chart in text [2 refs]
- EJERCITO (Antonio) Malaria in Cardona-Look, Rizal, during 1928 and 1929.—*Monthly Bull Philippine Health Serv* 1931 Jan Vol 11. No 1 pp 13-19. [4 refs]

- ESTAS & SAMBON. Recherches quantitatives des index splénique, malarien et gamétien, chez la population infantile du Camp de Panda.—*Bull. Méd. du Katanga*. 1931. Vol. 8. No. 4. pp. 101-104.
- ESTAS & SAMBON. Notes sur diverses circonstances accompagnant l'éclosion de la malaria chez les travailleurs U.M.—*Bull. Méd. du Katanga*. 1931. Vol. 8. No. 4. pp. 107-109.
- FISCHER (Otto). Die Bedeutung der modernen Malariaheilmittel für die Bekämpfung des Wechselfiebers.—*Klin. Woch.* 1931. Dec. 5. Vol. 10. No. 49. pp. 2266-2269.
- FISCHL (Friedrich). Bemerkungen zu dem Artikel: Ueber die Entstehung von Malariainfektionen im Vorfrühling von L. v. Berkesy.—*Wien. Klin. Woch.* 1932. Feb. 12. Vol. 45. No. 7. pp. 208-209.
- FISK (G. H.). Malaria and the Anopheles Mosquito in Canada.—*Canadian Med. Assoc. J.* 1931. Dec. Vol. 25. No. 6. pp. 679-683. [5 refs.]
- FRANCHINI (G.) & GANORA (R.). Casistica clinica ed ematologica delle varie forme di malaria dominanti nel bassopiano dell'Eritrea.—*Arch. Ital. Sci. Med. Colon.* 1931. Oct. 1. Vol. 12. No. 10. pp. 589-594. English summary (6 lines). [Inst. of Colonial Path., Univ., Modena.]
- FREEMAN (Walter). Therapeutic Malaria in Private Practice.—*Southern Med. J.* 1931. Nov. Vol. 24. No. 11. pp. 933-936. [1 ref.]
- GALLETI (Dante). La ricerca del parassita malarico col metodo dell'arricchimento.—*Policlinico. Sez. Prat.* 1931. Oct. 19. Vol. 38. No. 42. pp. 1541-1543. With 1 text fig. [1 ref.]
- HUART (A. J.). Malaria en appendicitis.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Dec. 1. Vol. 71. No. 17. pp. 1420-1424. [7 refs.]
- JEMMA (R.). Klinische Feststellungen ueber die Malaria der Kinder.—*Arch. f. Kinderheilk.* 1932. Feb. 5. Vol. 95. No. 3/4. pp. 227-241.
- KING (H. H.). A Note on the Expectation of the Relative Prevalence of Plasmodial Species when this is based solely on the Relative Output of Gametocytes.—*Indian J. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 353-356.
- KORTEWEG (P. C.). What is the Normal Type of Fever in the Primary Cases of Benign Tertian Malaria? Is it Tertian or Quotidian? With a Note by Lt.-Col. S. P. JAMES.—*J. Trop. Med. & Hyg.* 1931. May 15. Vol. 34. No. 10. pp. 129-131.
- DE LAGOUANÈRE (Joseph Marie Jean Louis) & ARÈNE. Considérations sur le paludisme.—*Arch. Méd. et Pharm. Milit.* 1931. Nov. Vol. 95. No. 4. pp. 373-401.
- LANE (Clayton). Housing and Malaria.—*J. Trop. Med. & Hyg.* 1931. Dec. 15. & 1932. Jan. 1. Vol. 34. No. 24 & Vol. 35. No. 1. pp. 405-411; 4-12. With 4 text figs. [2 pages of refs.]
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- LUTRARIO (Alberto). Attività della Commissione internazionale della malaria durante il 1930 e il 1931. Activities of the International Malaria Commission during 1930 and 1931.—*Riv. di Malariologia*. 1931. Sept.-Oct. Vol. 10. No. 5. pp. 611-627. English summary (7 lines). p. 672.
- MACDONALD (G.). The Significance of the Various Degrees of Splenic Enlargement in Malarious Communities.—*Records of the Malaria Survey of India*. 1931. Dec. Vol. 2. No. 4. pp. 569-602. With 11 figs. [19 refs.]
- MAGGIORA-VERGANO (Romano). L'attività della Scuola di igiene rurale e di profilassi antimalarica di Nettuno. (The Activities of the Rural School of Hygiene and Antimalarial Prophylaxis of Nettuno).—*Riv. di Malariologia*. 1931. July-Aug. Vol. 10. No. 4. pp. 499-511. With 2 figs. and 1 map in text. English summary (5 lines) p. 542.
- MESNARD (J.) & BORDÈS (L. A.). Note sur le taux d'infestation palustre de la main-d'oeuvre importée à son arrivée en Cochinchine.—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. June. Vol. 9. No. 6. pp. 492-497. [Pasteur Inst., Saigon.]
- MORIN (H. G. S.). Sur le mode le plus probable de la transmission du paludisme à Hanoi. Déductions prophylactiques.—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. Oct. Vol. 9. No. 9. pp. 739-745. [Pasteur Inst., Hanoi.]

- MORIN (H) & MESNARD (J) Nouveaux faits relatifs à la réceptivité naturelle des anophèles d'Indochine à l'hématozoaire du paludisme — *Bull Soc Path Exot* 1931 Dec 9 Vol 24 No 10 pp 919-923
- MORISHITA (Kaoru) Notes on Mixed Malarial Infection with Special Reference to Antagonism among Different Species of Malarial Parasites and their Segregation by the Use of Special Drugs — *Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1931 Sept Vol 30 No 9 (318) [In Japanese English summary pp 68-70] [Govt Research Inst, Formosa]
- NERI (Filippo) Nuovi metodi curativi della malaria (New Antimalarial Methods of Treatment) — *Riv di Malarologia* 1931 July-Aug Vol 10 No 4 pp 465-498 [5 pages of refs] English summary (7 lines) p 542
- NICOLAU (C F) & GINGOLD (N) Modifications hématologiques pendant les accès de malaria — *Arch Roumaines Path Expér et Microbiol* Paris 1931 Mar Vol 4 No 1 pp 119-134 With 8 charts in text [22 refs] [2nd Med Clinic & Hyg Inst Bucharest]
- PECORI (G) & ESCALAR (G) Relazione sulla campagna antimalarica dell'anno 1930 — Report on the Anti Malaria Campaign during 1930 in the Agro Romano — *Riv di Malarologia* 1931 Sept-Oct Vol 10 No 5 pp 545-610 With 18 text figs English summary p 671 [Health & Sanitation Office Rome]
- PIRAMI (Ester) & TASSI (Goffredo) Sughl effetti della chinoplasmuna nella malaria estivo autunnale in Eritrea — *Arch Ital Sci Med Colon* 1932 Jan 1 Vol 13 No 1 pp 32-39 English summary (4 lines) [Inst of Colonial Path, Univ, Modena]
- POZZI (Arnaldo) La malarioterapia mediante anofeli Utilità di istituzione di centri di allevamento e di infestazione degli anofeli per la diffusione della malarioterapia — *Policlinico Sez Prat* 1931 Dec 21 Vol 38 No 51 pp 1887-1892 With 1 text fig [14 refs] [Inst di Clin Med, Univ Rome]
- PRIEST (R C) A Case of English Malaria — *Jl Roy Army Med Corps* 1931 Dec Vol 57 No 6 pp 448-449 With 1 chart in text
- REBAGLIATI (Raul) Conceptos sobre virulencia e inmunidad en el paludismo — *Cronica Méd Lima* 1931 Aug Vol 48 No 818 pp 251-255
- SELWYN CLARKE (P S) The Seasonal Prevalence of Malaria in the Federated Malay States — *Malay An Med Jl* 1931 Sept Vol 6 No 3 pp 67-81 With 7 charts [25 refs]
- SERRA (V) Sulla patogenesi delle manifestazioni esantematiche ed emorragiche e degli edemi nel corso dell' infezione malarica (Eczematous Hemorrhagic and Edematous Syndromes in Malarial Patients) — *Riv di Malarologia* 1931 July-Aug Vol 10 No 4 pp 439-458 [2 pages of refs] English summary (4 lines) pp 541-542 [Inst of Specialized Med Path Univ Rome]
- SINFON (J A) Reports on Some Short Malaria Surveys undertaken in Kathiawar. — *Records of the Malaria Survey of India* 1931 Sept Vol 2 No 3 pp 349-405 With 4 charts [2 refs]
- SURBEK (K E) A Striking Case of Quartana Nephrosis — *Trans Roy Soc Trop Med & Hyg* 1931 Nov 30 Vol 25 No 3 pp 201-204 With 2 text figs [12 refs]
- SWELLENGREBEL (N H) ANNELCKE (S) & DE MEHLON (B) Malaria Investigations in Some Parts of the Transvaal and Zululand — *Publications of South African Inst Med Res* 1931 July Vol 4 No 27 pp 245-274 With 5 graphs 12 figs and 1 map on 9 plates and 1 folding map [9 refs]
- TIROUVANZIAM & LE-VAN-XUYEN Le paludisme à Kampot — *Bull Soc Méd Chirurg Indochine* 1931 Sept Vol 9 No 8 pp 620-632
- TOULLEC, ALAIN & JOLLY Anémie pernicieuse paludéenne — *Bull Soc Path Exot* 1931 Dec 9 Vol 24 No 10 pp 912-915
- VARGAS (Abel) Malaria Recaidas ou reinfeccões — *Brasil-Médico* 1931 Nov 14 Vol 45 No 46 pp 1066-1068
- ZANETTI (V) Note préliminaire sur la lutte anti-malaria et anti-moustiques à Léopoldville — *Ann Soc Belge de Méd Trop* 1931 Aug 31 Vol 11 No 3 pp 349-366 With 9 text figs

PLAGUE.

LEAGUE OF NATIONS MONTHLY EPIDEMIOLOGICAL REPORT. 1931.
Sept. 15. Vol. 10. No. 9. pp. 337-356. With 2 figs. & 7 maps.
[Refs. in footnotes.]—**Plague in 1930-31.** [In parallel French
and English.]

This world-wide review of plague refers to the period January 1930 to June 1931. The incidence of plague in the year 1930 was comparatively light; the notified cases were less than the number recorded in 1929 and a third of those recorded in 1928. The chief cause of this reduction was the decrease of the disease in British India; Java and Madagascar, two well-known plague centres, showed no change. The following notes refer to observations which seem to merit attention.

Plague still lingers among the native tribes in Morocco, but there has been no outbreak so severe as that which in 1911 ravaged the Doukkala tribes to the south-west of Casablanca, and caused more than 10,000 deaths. A mixed outbreak, in which pneumonic plague predominated, appeared along the course of the railway from Philippeville to Biskra and prevailed during January 1931; there were in all 76 deaths.

In December 1929 pneumonic plague broke out in Tunis among the immigrants of a tribe from the South, who worked in the city as porters; 53 persons died within a fortnight. Nearly all of these immigrants were quarantined, with the result that the epidemic was promptly brought to an end, although there were 18 cases among the "contacts" in the isolation hospital.

In Egypt the prevalence of plague has declined steadily since 1923, when it reached the high level of 1519 cases and 725 deaths. During 1931 the Dairut and Manfalut districts of the Province of Asyut and the Province of Giza yielded the greatest number of cases: the recent incidence upon Lower Egypt and in particular Alexandria has been unusually mild. Anglo-Egyptian Sudan still remains free from plague, in contrast with the neighbouring territory of Uganda, where from 1910 to 1930 inclusive, 57,000 deaths were notified. Plague is increasing in Kenya, for during the first 8 months of 1931 no fewer than 1758 cases were recorded. There is an infected but limited area in the mountains of the Eastern Province of Belgian Congo at an altitude of about 5,800 feet; here the pulmonary form is the most common (44 per cent.).

In the period July 1930-June 1931, in Madagascar plague increased from 1,710 cases with 1,584 deaths in 1929-1930 to 2,436 cases with 1,979 deaths. In December 1930 479 cases were reported—the highest monthly figure recorded for some years. A peculiar feature of plague in Madagascar is the constant proportion of pulmonary cases from year to year.

In Iraq plague is confined, with few exceptions, to the City of Baghdad, where in 1930 there were 109 cases and 51 deaths.

The reduction in British India has been considerable, for in 1930 only 23,825 deaths were reported as compared with 69,572 in 1929 and 135,647 in 1928; the Punjab has shown a striking improvement. In Bombay there were only 27 cases in 1930 and 25 cases during January-September 1931.

Java remains one of the chief centres of plague in the world. The infection gained access through the port of Surabaya, and has taken root chiefly in the central mountainous region, an experience which is

similar to that of the Deccan in India, Madagascar, Kenya and the Belgian Congo.

During 1930 Transbaikalia, the endemic focus of plague where the infection is maintained in the tarbagan (marmot), apparently remained free from human plague. During 1930-1931 no cases were reported from Hong Kong.

Australia has been free from plague since the year 1923.

In Europe a few cases were notified from Greek and French ports. In the port of Marseilles during 1930, there were 14 human cases of plague of which 2 were imported, and a considerable number of plague rats were found; whereas in the first six months of 1931 there were no human cases, and only a small number of plague rats.

There are at least two references in this report to the probable occurrence of the transmission of plague from man to man by the human flea. Thus BLOCH thinks that in Tunis there is a "maritime" plague, generally bubonic, and related to rat plague in ports; and a "rural" plague which takes either the pulmonary form or the septicaemic and the bubonic form and is conveyed through the medium of flea-bites [presumably human fleas]. The other reference mentions the excessive flea infestation of the native huts in the western part of Senegal, even after the huts have been razed by fire. This circumstance, together with the comparatively low incidence of rodent plague, is said to suggest inter-human transmission by means of [human] fleas. The reviewer's experience does not favour this theory and he regards evidence of this kind that has come to his notice as being of doubtful validity.

G. F. Petrie.

HIRST (L. F.). Report on the Protection of the Interior of Ceylon from Plague with Special Reference to the Fumigation of Plague-Suspect Imports.—*Colombo Rep. XXV of Med. Officer of Health for Year 1930.* Annexure C. pp. 46-92. With 4 diagrams and 4 figs. on 2 plates. [45 refs.]

In this Report Dr. Hirst describes how plague infection is introduced into Ceylon through the port of Colombo and how, as a result, there is, in his opinion, a considerable risk of the infection taking root in the interior of the island. He devotes a good deal of space to a discussion of the efficacy of HCN gas as a disinfesting agent for ships and their cargoes. The mass of detailed information in the Report cannot be adequately summarized here, but the following points of interest may be noted.

The infection was brought into Colombo in shipments of rice from Rangoon 17 years ago. This city is the port of shipment for most of the half million tons of rice and the 50,000 tons of grain of various kinds which are imported annually into Ceylon. Much of the rice is consigned to the highland tea-planting estates, which are 1,500 to 5,000 feet above sea-level. As a consequence *X. cheopis* has been introduced, and has become a well-established ecto-parasite of the rats in the "boutiques." The climatic conditions are favourable to the spread of plague, and thus there is a danger that the infection may become endemic in the upland districts. Moreover there is a risk of an epizootic spreading among the field rodents and establishing a rural focus like those which have been found in many other countries.

Rangoon and Bombay constitute the two chief sources of infection

for Ceylon, although the measures which have been taken within recent years against rats, for example, rat-proofing and structural improvements of warehouses, have brought about a striking reduction in the incidence of plague in these cities. Rangoon is the more important source, and here the infection has been traced to the highly rat-infested rice mills and rice stores, which are to be found on the banks of small tributaries of the Rangoon river. Thence the rice is conveyed by rat-infested lighters to ships in the river and thus to Colombo. Most of the fleas in the rice mills are carried by *Gunomys bengalensis*, the mole-rat, but 92 per cent. of the fleas of this rodent are *X. astia*, a species which is less dangerous as a plague carrier than *X. cheopis*, and less readily transported overseas. *R. concolor*, *R. rattus*, and *Mus musculus* are the important rodents in the mills, because they carry mostly *X. cheopis*, and because each is subject to plague. In Rangoon city the mole-rats and *R. norvegicus* are outdoor animals, and their fleas consist largely of *X. astia*, whereas *R. concolor*, *R. rattus* and *M. musculus* live for the most part within houses, and are infested with *X. cheopis*.

Rangoon and Bassein seem to be the only ports in Burma in which plague is definitely endemic: Moulmein, a port in which *X. astia* is the predominating species of flea on the rodents, is much less severely affected, and Akyab, where also *X. astia* is the chief species, is almost free from plague. Observations have recently been made on the rat and rat-flea infestation of ships in the port of Rangoon; 87 ships yielded 461 rats from which 975 fleas were taken, and of these 94 per cent. were *X. cheopis* and 6 per cent. were *X. astia*. In August 1928 a rat-flea survey of ships moored in Colombo harbour was begun, with the result that 133 ships yielded 737 rats and 1,743 fleas, of which 95 per cent. proved to be *X. cheopis* and 5 per cent. were *X. astia*.

The author thinks that attention should be concentrated on rice, grain, and cotton as the important media for the introduction of rat-fleas. Recent observations in Colombo and Madras city indicate that cotton is particularly liable to harbour rat-fleas. Thus the only premises in these cities where *X. cheopis*—an alien flea—is found in large numbers on rats are mills which store cotton that has come from localities in which the rats are infected with *X. cheopis*.

In Colombo, despite energetic rat-control measures such as the construction of modernized rat-free warehouses and regular rat-catching operations, the rat population is still fairly large and plague epizootics have occurred. Nevertheless the author recommends the adoption of intensive measures for rat destruction on the harbour front by means of trapping and the laying of baits containing barium carbonate. He refers, apparently with approval, to the suggestion made by Dr. C. G. Crow, the Port Health Medical Officer of Rangoon, that cyanide fumigation of ships moored in the ports of Rangoon, Colombo and Singapore which show signs of excessive rat infestation or of plague infection should be entrusted to a fumigation Company under official supervision. The fumigation of all the rice and other grains which are brought to Colombo from plague-infected ports is scarcely practicable under existing circumstances; only the really dangerous consignments can be treated in this way.

Hydrogen cyanide gas is the most efficient agent for the destruction of rats and rat-fleas that has been tested up to the present. The author carried out a number of tests, employing laboratory apparatus on a small scale, to ascertain the ability of HCN gas to penetrate rice grains

and to cause rat-fleas to burrow into the rice in order to escape from the poisonous action of the gas. An experimental tunnel was constructed, into which bags containing various grains were put; a forced draught of air impregnated with HCN gas was passed through the tunnel, and the effect on rat-fleas, which were placed in each bag for the purpose of serving as an indicator of lethal action, was noted. These insects are extremely sensitive to the presence of small concentrations of HCN. Similar experiments were carried out in lighters with the aid of a Liston Cyanide fumigator. The results were satisfactory.

G. F. Petrie.

WU LIEN TEH [M.A., Md., B.C. (Cantab.), M.D. (Tokio), Hon. Litt. D. (Peking); LL.D. (H'kong); Sc.D.: C.P.H. (J'Hopkins), Director & Chief Medical Officer of the Service, etc.] [Edited by]. **Reports 1929-1930. Manchurian Plague Prevention Service. Being Volume VII of the Series.**—pp. v+233. Ill. [A fuller review appears in *Bulletin of Hygiene*.]

This volume, the seventh of the series of reports of the Manchurian Plague Prevention Service, is full of interest. Of the 34 items presented half are reprints of articles which have appeared elsewhere, 9 others are annual reports of hospital activities and consequently of topical rather than of general importance. Seven are concerned with plague. Dr. Wu Lien Teh, Director of the Service, contributes a short preface. He notes that the tarabagan regions, where for the last ten years there have been almost annual manifestations of the disease, were entirely quiescent during the 1929-30 season and ascribes this largely to destruction of these rodents in recent years. The focus newly discovered in 1927-8, in the Tungliao district, South Manchuria, continued to be a source of anxiety and the organization consequently closed in part certain stations in North Manchuria and opened new ones in Tungliao and Chengchia-tun, in South Manchuria. The staff was also engaged in investigating a limited outbreak of cholera in Shanghai. The Plague Prevention Service, by a decree of the National State Council of April 4th 1931, now comes under the Central Health Administration of the Ministry of Interior, Nanking.

Of the seven articles dealing with plague, the first, on Rodents of Manchuria and Mongolia and their Significance in Disease, is a reprint from the *Natural History Bulletin of the Peking Society*. It is shown that the problem of plague in these regions is complicated. In Transbaikalia, Mongolia and adjacent parts of North Manchuria the tarabagan plays the chief rôle in the spread of plague to man and researches carried out in the Harbin laboratory show that it is owing to these animals harbouring the disease during hibernation that infection is carried from one plague season to another. Some of the smaller field rodents were also found infected. In Tungliao the domestic rats suffer from plague and are concerned in its spread; the question whether they derive it from wild rodents is undecided and is to be further studied.

Next follows a paper on Surgical Aspects in the Treatment of Bubonic Plague, reprinted from the *Proceedings of the Honolulu Conference*. The subjects of early incision or excision are discussed and the value of antiserum.

Certain investigations during the Tungliao outbreak in August 1929 form the subject of the third article. Research work was considerably

hampered by the fact that outbreaks often occurred simultaneously in several, widely separated, villages. Large numbers of fleas were collected from dogs in infected villages, but, strange to say, all proved to be *Pulex irritans*, none were *Ctenocephalus canis*. None of the *Pulex*, however, was found infected, even though collected from men, dogs and the sleeping platforms of plague-infected houses; whereas all the *X. cheopis* caught in the clothes or on these platforms had *P. pestis* in their alimentary tracts. At the beginning of the report are three beautifully coloured plates showing in longitudinal sections of the fleas the stages of infection and growth of organisms. Even in a hut where human plague had not yet occurred (though they did arise some days afterwards) all the *Xenopsylla* collected were infected.

In a brief abstract of a long paper on Mites as Plague Carriers, which appeared *in extenso* in *Zoologische Jahrbuecher*, 1930, it is concluded that none of the 9 species mentioned and described played any important part in spreading an epidemic, even though the epidemic is the result of one epizootic among the rodents on which the mites were found.

The remaining three papers deal with the disease in South Manchuria and in the Tungliao area in particular. This area is an extensive one between Inner Mongolia on one side and Manchuria proper on the other, and plague is now endemic there. Infected rats enter from Mongolia, fleas are introduced by travellers and in their luggage, and also in cargoes. What part wild rodents play is not known, for none has been found naturally infected. The 1927-8 outbreak caused some 600 deaths.

The sites of the buboes were in the proportions roughly of 3 femoral and inguinal, 2 axillary, 1 cervical, but 19.5 per cent. presented no buboes—septicaemic cases; there were no pneumonic.

The main features of the South Manchuria outbreak (apart from Tungliao), were that small villages at short distances from the railways were chiefly involved; the type was largely bubonic. Many, in fact the majority, were not seen by doctors and were heard of only after the outbreaks had spontaneously subsided. The fatality rate appeared to be high, but exact figures were not obtainable.

H. H. S.

ANDO (K.), KURAUCHI (K.) & NISHIMURA (H.). Une nouvelle région de peste endémique dans la partie nord-est de la Mongolie intérieure. [**New Centre of Endemic Plague in Mongolia.**—*Bull. Office Internat. d'Hyg. Publique*. 1931. Sept. Vol. 23. No. 9. pp. 1592-1604. With 1 map in text.

Since 1924 epidemics resembling plague have been reported from the north of Tungliao in the northeast of Inner Mongolia. These outbreaks were identified as plague by Japanese and Chinese doctors in 1927-28. Drs. Nishimura and KODAMA were sent to Malizintsu and other villages to make an enquiry. The authors describe the area in which plague is found and give a map of the country. They discuss the character of the epidemics and the possible origin of plague in this region. As regards rodents which have played an essential rôle in these epidemics the authors consider the *susliks*, *Citellus dauricus* and *Alactaga mongolica* the most dangerous. Rats are common enough, but not of so much importance.

J. H. Tull Walsh.

MOSTAJO (Benjamin), LONG (John D.) & ESKEY (C. R.). La campaña antipestosa en el Perú. [**The Antiplague Campaign in Peru.**]—*Crónica Méd.* Lima. 1931. May. Vol. 48. No. 815. pp. 155-160.

This is an account of the first 6 months of the campaign against plague in various Departments of Peru from October 1930. In Lima during the period in question there were 18 cases of human plague, the average for the preceding 5 years being 42·2. Rats were destroyed partly by poison (arsenic), partly by trapping. The cheopis index on *R. norvegicus* was 3·28 in October 1930, 0 in February 1931; on *R. alexandrinus* and *R. rattus*, 9·2 in October, 0·23 in February. In Callao the figures [species of rat not stated] were from November to February 17·65, 3·41, 8·26 and 5·15 respectively. There were no human cases during this period. In the Province of Pacasmayo (La Libertad) there were 27 human cases in the first 3 months, 8 in the second, and the flea index was 34·72 in December, 15·4 in January, 0·8 in February.

Special investigations were undertaken to determine whether a small rodent (pericote) was a carrier. In none of 3,248 subjected to autopsy was any positive evidence found, and inoculation with liver and spleen emulsions from 83 also proved uniformly negative.

The staff for examining the rats and for taking smears and for sending fleas to the central laboratory were trained at the laboratory.

H. H. S.

LONG (John D.). **Cooperative Campaign for the Eradication of Plague in Peru. Final Report.**—*Public Health Rep.* 1931. Sept. 11. Vol. 46. No. 37. pp. 2161-2168.

In June 1929 the Pan-American Sanitary Bureau authorized co-operative epidemiological studies of plague in such South American countries as had plague in their territories. Peru accepted the proposed co-operation in September 1930 and the Government gave all possible assistance to those who carried out the campaign. The country was divided into sectors, generally coinciding with the boundaries of the Departments. To each Department there was sent a sanitary assistant, charged with the duty of spreading poison in all places where cases of plague had occurred during the preceding five years. To the chief seaports of the Republic there were sent assistant epidemiologists who were instructed to trap and examine rats and send smears from rats or guineapigs which had died after inoculation, with material obtained from rats. These assistants also sent fleas to the Lima laboratory for identification and computation of prevalence. Rat poisoning was also carried out in the ports and neighbouring towns. The cases of plague in the whole Republic during 1930 were: January, 56; February, 29; March, 16; April, 36; May, 26; June, 26; July, 11; August, 22; September, 13; October, 28; November, 37; December, 78. For 1931 the figures (up to July 20th) were: January, 33; February, 28; March, 9; April, 16; May, 2; June, 9; July, 1. The rats of Peru are *R. norvegicus*, *R. rattus* and *R. alexandrinus*. They may all be carriers of plague and harbour *X. cheopis*. All the seaports of the country were free from bubonic plague when this paper was written. The last case in any

seaport was recorded in April 1931 and the last infected rat in March 1931. Epidemiological data are given for the Departments and for the seaports. The campaign—September 1930 to June 30th 1931—was conducted in the most economical manner and there was a small balance left for purchase of arsenic and new traps to replace those which became useless during the campaign.

J. H. T. W.

COLOMBANI. La vaccination antipesteuse au Maroc en 1929–1930. [**Anti-Plague Vaccination in Morocco.**]—*Bull. Office Internat. d'Hyg. Publique*. 1931. Sept. Vol. 23. No. 9. pp. 1619–1623.

During the epidemic in Sous, 1929, the author studied the effects of anti-plague vaccination. The total number of vaccinations performed was 96,050. Three vaccines—vaccine from the Pasteur Institute, lipo-vaccine, and P.S.T. vaccine prepared from the pseudo-tuberculosis bacillus of rats—were employed and the author states that they gave practically the same results. Even if the vaccination does not confer certain protection on each individual it produces immunity for the majority. The immunity is not constant and not of long duration. [See also this *Bulletin* Vol. 28, p. 381 ; p. 874 (DANY).]

J. H. T. W.

GIRARD (G.) & HÉRIVAUX (A.). Recherche des porteurs sains de bacilles pesteux dans la région de Tananarive. [**Search for Healthy Carriers of Plague in Madagascar.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 748–751. [Pasteur Inst., Antananarivo.]

These researches were made in the Civil prison at Antananarivo and in connexion with the plague hospital. In the prison a case of plague occurred in July 1930. All the prisoners were examined, but no carriers were found. Among 124 "contacts" examined by the authors no healthy carriers were found in relation to cases in the hospital. [This *Bulletin*, Vol. 28, p. 393 (LEGER).]

J. H. T. W.

GUILLINY (R.). La peste pulmonaire en Emyrne (Madagascar). Essai de traitement par le bactériophage. [**Pneumonic Plague in Madagascar treated with Bacteriophage.**]—*Marseille-Méd.* 1931. Nov. 25. Vol. 68. No. 33. pp. 641–653. With 6 text figs.

This paper refers to a small epidemic which occurred in 1926. There were 22 cases with 21 deaths and 1 recovery. Of these pneumonic cases, 5 were treated with d'Hérelle's pestiphage: 3 by intravenous injections and 2 by direct injection into the lungs and 3 others were treated by injections of bacteriophage from the Pasteur Institute into the lungs. A case of septicaemic plague was also treated with intra-venous injections of the bacteriophage. Not one of these nine cases received any benefit from the treatment.

J. H. T. W.

OTTEN (L.). Het probleem van de "seasonal prevalence" der pest. [**The Problem of Seasonal Prevalence in Plague.**]—*Geneesk. Tijdschr. v. Nederl. Indië*. 1932. Jan. 1. Vol. 72. No. 1. pp. 28-37. With 3 graphs in text. [4 refs.]

In accordance with the British Indian Plague Commission the author showed that the periodicity in the prevalence of plague in Java (at least in the mountainous parts) runs parallel with the rat flea index. The epidemic prevalence of plague in Java shows a rise in the third quarter of the year (the driest season) and reaches its summit about the end of the year. Thereafter—but still in the middle of the rainy season—there is a lowering of the curve which reaches its lowest point in the second quarter of the year.

The flea index follows at some distance the curve of low relative humidity of the atmosphere, an observation more or less contrary to experience in India.

W. J. Bais.

ARNAUD (J.) & RAYBAUD (A.). La prophylaxie anti-pestreuse à Marseille. [**Prophylaxis of Plague in Marseilles.**]—*Marseille-Méd.* 1931. June 25. Vol. 68. No. 18. pp. 789-808. With 3 text figs. [5 refs.]

This is a combined report from the Director of Municipal Hygiene and the Chief of the Laboratory of Maritime Sanitary Service. It contains a full and detailed account of the laws under which plague is made a notifiable disease and describes the duties of medical men under these laws. The chief measure of prophylaxis consists of isolating and vaccinating all "contacts" exposed to the same contagion as the plague patient and this is often found very difficult owing to opposition from the people themselves. The necessity for destruction of rats and proper construction of buildings is discussed. Stress is laid on the value of information and instruction given to the general population concerning infectious disease and value of Hygiene since, as the authors remark: "The French, especially in the South, do not like to obey without understanding."

J. H. T. W.

RAYBAUD (A.). A propos de quelques cas de peste survenus à Marseille. [**Plague in Marseilles.**]—*Marseille-Méd.* 1931. May 25. Vol. 68. No. 15. pp. 669-694. With 9 charts in text. [1 ref.]

— & GUGLIELMI (F.). Quelques propos sur l'épidémiologie de la peste. [**Epidemiology of Plague.**]—*Ibid.* Sept. 25. No. 27. pp. 357-368. With 1 text fig. [Refs. in footnotes.]

The author states that, from the beginning of the twentieth century, hardly a year has passed without a few cases of plague in Marseilles. Most frequently the cases are found on ships arriving in the port and these are isolated at once. Sometimes sporadic cases or small epidemics occur in the town, generally in the area near the port. Fifteen cases are described in detail as occurring in 1930. Eleven recovered and four died. Of the latter one case had marked pneumonic disease; in the sputum of that patient the plague bacillus was found together with the pneumo-bacilli of Frankel and Friedlander. Treatment with anti-plague serum gave good results.

J. H. T. W.

- i. GRAHAM (J. D.). Recherches sur les puces des rats dans la Présidence de Madras. [**Fleas and Rats in the Madras Presidency.**]—*Bull. Office Internat. d'Hyg. Publique*. 1931. Sept. Vol. 23. No. 9. pp. 1613-1615. [7 refs.]
- ii. ———. Résultats obtenus avec le sérum antipestueux de l'Institut Haffkine. [**Results with Anti-Plague Serum.**]—*Ibid.* pp. 1616-1618.
- i. Contains nothing that has not previously been published, see this *Bulletin*, years 1920-1929 Index (GOYLE, HIRST, CRAGG).
- ii. Gives a table of results obtained by Col. F. P. MACKIE and Dr. B. P. B. NAIDU, in the Lingampalli Plague Hospital, Hyderabad (Deccan).

Total admissions to the Lingampalli Plague Hospital, Hyderabad (Deccan) from 11 February to 4 March 1931 = 76 cases.

Category	Diagnosis by culture		Treated by the serum		Controls	
	Bubo	Blood	Cases	Deaths	Cases	Deaths
A Grave septicaemia with or without buboes.	+	+++	10	7	8	8
	—	+++	1	1	3	3
	+	++	3	2	4	4
	—	++	1	1	2	2
			15	11 (73·3%)	17	17 (100%)
B Early or light septicaemia or bubonic only	+	+	7	1	3	2
	—	+	1	0	1	1
	+	—	11	3	4	1
			19	4 (21%)	8	4 (50%)
C	Clinical plague bacteriologically negative		9	0 (0%)	8	2 (25%)
Total of all cases			43	15 (35%)	33	23 (70%)

+ = less than 10 colonies in 0·25 cm³ of blood.

++ = less than 100 colonies in 0·25 cm³ of blood

+++ = 100 colonies and more in 0·25 cm³ of blood.

[See also this *Bulletin*, Vol. 28, p. 381 (GRAHAM).]

J. H. T. W.

NAIDU (B. P. B.) & MACKIE (F. P.). **The Serum Therapy of Plague.**—*Lancet*. 1931. Oct. 24. pp. 893-897. [Haffkine Inst., Bombay.]

A very interesting communication is here presented of the transference of precise, controlled laboratory experiments to practical application in man. Even the human trials have something of the precision of a laboratory experiment and are as well controlled statistically as is usually possible. The authors select rabbits, sheep, or cattle to furnish the curative sera in place of the horse because these animals are naturally susceptible to pasteurella infection. They

advocate and use as antigen a highly virulent strain of *Past. pestis* and prefer the intravenous route for administration because subcutaneous injection gives too severe local and general reactions. Only one calf survived out of the two experimental animals used and it received 38 intravenous injections in 12 months, beginning with one-fifth of an agar slope and ending with 100 slopes at a dose. Tables II, III, IV, V and VI give the results of administration of serum in the rabbit after infection, the comparison of immune sheep and calf serum with other plague sera, and the statistical results of use in human beings. Table II sets out that serum was administered in rabbits after infection, immediately, 24, 48, 72 and 96 hours after, in 34, 40, 43, 48 and 25 rabbits with mortalities of 0, 0, 9.3, 31.2, 32 per cent. respectively. Untreated control animals, 33 in number, gave a mortality of 94 per cent. The human trials, at first of every alternate case and then of every third case, gave when class C, consisting of cases not bacteriologically confirmed is excluded, 15 deaths out of 34 cases as compared with 21 deaths out of 25 in the control series. These are striking figures and "the results when applied to a small human epidemic were very promising."

W. F. Harvey.

SCHUT (J.). Behandeling van pestlijders met Omnadin. [**Plague Treatment with Omnadin.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Sept. 15. Vol. 71. No. 12. pp. 1059-1069. With 7 charts in text.

Referring to previous papers on this subject (see this *Bulletin*, Vol. 27, p. 734) the author now quotes further experience. In the Tengger mountains (East Java) outbreaks of plague show a remarkable inclination to pulmonary manifestations. Bubonic plague is rare, plague pneumonia, either primary or secondary after septicaemic plague, is the common form. In view thereof the author emphasizes the necessity of immediate isolation of every contact in cases of suspected plague in his district. Any delay or waiting for the confirmation of the diagnosis leads to further spread of the disease.

Convinced of the beneficial influence of Omnadin injections, Schut treated all the isolated contacts prophylactically with this drug; since which among this group were seen no cases of primary plague pneumonia, only cases of bubonic plague and septicaemic plague, which means a certain advantage in view of the prognosis.

Out of 7 seriously ill contacts two patients died from plague with secondary pneumonia. Five recovered, four of whom had no doubt suffered from plague.

Omnadin injections are harmless, even if given in large doses (e.g. 8 cc. in 24 hours, or 2 cc. 37 times within 2 weeks) and painless. Administered with therapeutic purpose their action must be supported by cardiotonics. In patients who died notwithstanding the Omnadin treatment, post mortem no plague bacilli could be detected, contrary to experience in previous cases.

[The latter advantage appears rather problematic. The curious substitution of bubonic and septicaemic for primary lung plague (which would imply another mode of infection) under influence of prophylactically administered Omnadin is a feature for which no explanation is offered.]

W. J. Bais.

LENSKAJA (G. N.), EGOROW (A.), SIWOLOBOW (W.), LARIONOWA (S.), MARJINA (J.), LEBEDEWA (E.), BARSUKOWA (O.) & DIKOW (A.). Lebenserhaltung des *B. pestis* bei vieljähriger Aufbewahrung auf Nährböden. [**Duration of Life of *B. pestis* on Media.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 2. pp. 149–156. [11 refs.] [In Russian. German summary pp. 156–158.]

Of 302 cultures some were found to be still living from $1\frac{1}{2}$ to $6\frac{1}{2}$ years after their original sowing, although no subcultures had been made.

W. F. Harvey.

GIRARD. Les diverses formes de peste à Madagascar. [**Different Forms of Plague in Madagascar.**]—*Bull. Office Internat. d'Hyg. Publique.* 1931. Sept. Vol. 23. No. 9. pp. 1605–1610. With 3 diagrams. [1 ref.]

This is a compilation consisting mainly of graphs and charts for the years 1926 to 1930. It contains nothing new.

J. H. T. W.

BESSONOWA (A.). Noch ein Fall von Pigmentbildung beim Peststäbchen. [**Another Case of Pigment Formation by Plague Bacilli.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 2. pp. 159–164. With 2 text figs. [2 refs.] [In Russian. German summary pp. 164–165.]

A stab agar culture which had been kept for $2\frac{1}{2}$ years without subculture developed a golden yellow pigment. Subcultures of the original, of 10 to 15 days' growth, also exhibited pigment, but of another colour, rose, brown and white. Smears made from pigmented cultures showed a considerable number of spherical plague bacilli.

W. F. Harvey.

APPEL. Epidémie de peste pulmonaire de Condé-Smendou (janvier 1931).—*Rev. d'Hyg. et de Méd Préventive.* 1932. Jan. Vol. 54. No. 1. pp. 5–40. with 8 text figs.

COUVY. La peste à l'Hôpital Central Indigène de Dakar, en 1929. Extrait du rapport annuel.—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.–May–June. Vol. 29. No. 2. pp. 318–328. With 1 chart in text.

FONQUERNIE. Quelques considérations sur la peste à Tananarive. (Epidémiologie, clinique, traitement).—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.–May–June. Vol. 29. No. 2. pp. 246–286.

FONQUERNIE. Note sur l'épidémiologie de la peste à Tananarive (peste humaine et peste murine).—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 863–865. [Bureau of Hygiene, Antananarivo.]

FONQUERNIE (J.). Considérations sur un cas de longue incubation de peste pulmonaire.—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 904–906. [Municipal Bureau of Hygiene, Antananarivo.]

FULCONIS. La peste au Sénégal en 1929. Extrait du rapport annuel.—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.–May–June. Vol. 29. No. 2. pp. 286–311. With 1 chart.

GIRARD (G.). Au sujet de la peste murine en Emyrne.—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 865–867. [Pasteur Inst., Antananarivo.]

MARQUE. La peste dans la circonscription de Dakar et dépendances, en 1929. Extrait du rapport annuel.—*Ann. de Méd. et de Pharm. Colon.* 1931. Apr.–May–June. Vol. 29. No. 2. pp. 311–317.

CHOLERA.

LEAGUE OF NATIONS MONTHLY EPIDEMIOLOGICAL REPORT. 1931.

July 15. Vol. 10. No. 7. pp. 263-271. With 3 maps in text.—

Cholera in 1930-31. [In parallel French & English.]

Cholera incidence declined markedly during 1930 in the greater part of the world, and this decline was maintained in the early months of 1931. British India remained the most important focus, the disease far from decreasing, taking a larger toll than during preceding years. Short and localized epidemics, which were promptly suppressed, occurred in Afghanistan and Persia. In the Philippines, after several years of absence, cholera made its appearance again in March 1930 and was still persisting in July 1931. Tables are given showing the distribution of the disease, number of cases and deaths throughout the area from which information is gathered.

J. H. Tull Walsh.

NORMET (Léon). Le choléra en Annam. [**Cholera in Annam.**]—

Bull. Soc. Méd.-Chirurg. Indochine. 1931. June. Vol. 9. No. 6. pp. 449-454.

For the past five years cholera has been the only serious epidemic disease in Annam. The usual measures for protection stayed the progress of the disease but did not abolish it. In 1927 anticholera vaccination on a large scale was adopted and 3,669,961 vaccinations were carried out. The value of this vaccination is incontestable. In the month of August 1927, there were 619 cases and 447 deaths. In September the vaccinations were completed and in October the number of cases fell to 9 with 5 deaths. Vaccine in one injection of 2.0 cc. [strength not stated] was efficacious and convenient. It is difficult to carry out vaccination in two doses except in schools or among troops and civil servants. It was found that vaccination of "carriers" sometimes caused a severe attack of cholera. This danger can be avoided if each individual is given 5.0 gm. of lactic acid in 250.0 gm. of water a few minutes before the inoculation. Cholera has practically disappeared—so far as statistics are available—since 1927. Lactic acid is not only valuable as a preventive, but of great importance in treatment of cholera. Injections of saline solution and Kaolin were most useful.

J. H. T. W.

i. CORPUS (Teofilo). **The Problem of the Control of Cholera Carriers.**—*Jl. Philippine Islands Med. Assoc.* 1931. Dec. Vol. 11. No. 12. pp. 469-473. [6 refs.]

ii. —. **The Cholera Campaign and the Experience gained therefrom.**—*Ibid.* pp. 477-481. [Meisic Health Station, Manila.]

i. The control of cholera carriers is still an indefinite and difficult problem for health workers. At present only a certain class of people, principally food handlers, can be examined. There should be regulations obliging the entire population to submit stool specimens to enable the officials to determine the presence of carriers and there should be laws requiring the parole of cholera carriers for a period of four years.

ii. In the City of Manila division of work and notification of cases made possible the rapid suppression of the disease. Increase in and

mortality from gastroenteritis may be an indication of the possible appearance of cholera. Vaccination proved effective. The taking of stool specimens, disinfection and cleaning of premises all helped to control the disease. Inspection of cadavers and taking of swabs make possible the detection of cholera.

J. H. T. W.

SIAN (Jose). **Report of Trip to the Province of Occidental Negros.**—*Monthly Bull. Philippine Health Serv.* 1931. Mar. Vol. 11. No. 3. pp. 132–139.

This is an official report to the Director of Health, Manila, on cases of cholera in the province of Negros and on the sanitary conditions at the end of 1930. The number of patients seen was 51. Of these 23 had been vaccinated against cholera. A large number of carriers was found. The sanitary conditions were generally bad and even 3 out of 10 artesian wells rendered positive results for cholera vibrios.

J. H. T. W.

HERNANDO (Eugenio). **The Control of Cholera in the City of Manila throughout the Different Epochs.**—*Monthly Bull. Philippine Health Serv.* 1931. Feb. Vol. 11. No. 2. pp. 49–81. With 4 diagrams. [29 refs.]

The first scientific recommendations of measures of prophylaxis against cholera in Manila date from 1820, when CASAS advocated cleansing of the city and sewerage, but no action seems to have followed. Some sewerage was provided in 1852 and by 1882 a water supply, described as giving water of poor quality, was completed. After the epidemic of 1888 a maritime quarantine and a military or sanitary cordon were introduced. There was another epidemic in 1894. The first epidemic of cholera after the sovereignty passed to America was in 1902. Active sanitary measures were taken. The water supply was protected, insanitary properties were destroyed and the sale of fruits and vegetables was prohibited. The epidemic, however, to quote the author, "following its natural course, continued till the year 1904 ending by consumption, that is, because no more susceptible persons were available to its voracity." A table shows that since 1903 there have been three occasions when the number of cases exceeded a thousand, viz. in 1906, 1908 and 1916. In the decennium 1921–30, although in all but 2 years cases are recorded, only once (1925) did the number exceed 100.

The author next gives an account of the sanitary organization of the city at the present time. A new water supply begun in 1925 was completed in 1931. The water is chlorine-treated; the reservoir annex has a capacity of 9,000,000,000 gallons (the present population of the city is 332,778). Although a fair proportion of the houses are on the sewerage system it is estimated that over eighty thousand persons still dispose of their dejecta to the possible danger of the public health. In 1923 anticholera inoculation was made compulsory. Since 1920, when inoculation was first used extensively, the numbers of persons receiving it have increased from 15,623 in 1920 to 265,676 in 1929.

The author seems to think that the money this cost might have been better spent on sanitary improvements.

The author next divides the data into three sets. (1) The first period, 1905-14, characterized by active sanitary improvements; (2) The second period, 1915-19, when nothing was done; (3) The third period, 1920-29, when the only improvement was the introduction of anti-cholera inoculation.

In each period he fits a straight line to the annual cases and another straight line to the annual deaths. In the first and third period these lines slope downwards and in the second period upwards. The author thinks that these are proofs that the sanitary improvements of the first period and the introduction of inoculation in the third period were responsible for the trends. The author has also calculated the correlation between the proportion of the population immunized and the attack rate from cholera, allowing a lag of one year, i.e. the variables are proportion immunized in year n , proportion attacked by cholera in year $n+1$. The co-efficient is -0.57 ± 0.15 . He concludes that these calculations confirm the "efficacy of the anti-cholera inoculation as an efficient sanitary measure."

He has, however, noted earlier in the report that "vaccination against cholera may be used as an emergency measure for the control of an already existing epidemic of said disease, but could not be used easily as a permanent and routine sanitary measure."

[Were the series of years available sufficiently long—which they were not—for analysis on these lines, it would be necessary to adopt somewhat more refined methods. Since, on the whole, cholera has decreased while, on the whole, the number of immunized persons has increased with time these variables must be negatively correlated; but that does not go very far towards establishing a causal relation. The usual method would be to correlate deviations from the respective secular trends. But the trends are very irregular. That the straight lines are wholly inadequate representations of the trends in the sub-periods appears from the fact that, for instance, in the 2nd period more than 88 per cent. of all the cases occurred in 2 out of the five years, and in the 1st period over half the total occurred in 2 out of the 10 years. In other words the author's statistical calculations do not materially strengthen any inferences which a reader may be disposed to draw from the evidence as a whole.]

M. Greenwood.

KIRIBAYASHI (Shigeru). i. **Notes about the Early Diagnosis of Cholera. Part I. Especially on the Agglutination Test when Pepton-Water is used as the Medium.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*.—1931. Oct. Vol. 30. No. 10 (319). [In Japanese. English summary pp. 80-82.]

— ii. **Supplementary Notes about the Early Diagnosis of Cholera. Part II. Especially on the Bacteriolysis Test when Peptone-Water is used as the Medium.**—*Ibid.* Dec. No. 12 (321). [In Japanese. English summary pp. 103-105.]

i. In this test a series of 10 tubes is set up, each containing 2 cc. of 1 per cent. peptone water. A dilution of a cholera agglutinating serum is made at 1 in 25 with the same 1 per cent. peptone water, and 2 cc. of the serum-dilution is added to No. 1 of the series of tubes. Successive transferences of 2 cc. of mixtures made in each of the tubes, except the last, which remains as a control, give dilutions of cholera serum in peptone water ranging from

1/50 to 1/12,800. A suspicious colony from a plate culture spread with test faeces is suspended in 1 cc. peptone water and one drop added to each of the 10 serial tubes. The tubes are then incubated for 3 hours and readings taken of the resultant agglutination. The test is claimed to be not only rapid, but more sensitive than ordinary methods of test.

ii. The test is an *in vitro* one of specific bacteriolysis. A loopful of a 20-hour agar culture of test vibrio is suspended in peptone water (peptone 3; sod. chloride 5; dist. water 1,000) of pH 7.6 which is isotonic with the serum components of the test. A comparison is made by setting up two sets of dilution mixtures, the one containing inactivated immune serum, complement and suspension of test organism and the other, a control, containing inactivated rabbit serum, complement and suspension. Specific bacteriolysis is indicated already after 3–5 hours by the absence of turbidity in the first set of mixtures and positive turbidity in the control set.

W. F. Harvey.

SHOUSHA (A. T.). **Group Agglutination Reaction in Cholera. (A Contribution to the Identification of *V. cholerae*.)**—*Jl. Egyptian Med. Assoc.* 1931. Sept. Vol. 14. No. 9. pp. 438–453. [16 refs.]

Two vibrios, Nos. 20 & 67, were isolated at El Tor from the faeces of pilgrims, one from a case of dysentery and the other from a normal individual. No 20 has been carefully examined by the author in strict comparison with a true cholera vibrio, the Kolle strain. It is largely a question here of the establishment of group agglutination of non-cholera vibrios by a cholera serum. *Vibrio* "Kolle" was agglutinated both by the testing serum of the Public Health Laboratory, Cairo, and that of the El Tor quarantine station. *Vibrio* No. 20, however, was not agglutinated by the Public Health serum, but was agglutinated by the El Tor serum. It was found in the investigation that the agglutinative receptors of the El Tor vibrios 20 and 67 with the Quarantine serum were the group labile or flagellar receptors (H) and that the specific, somatic (O) receptors of these two vibrios were quite different from the somatic receptor of the true cholera vibrio. It is very desirable therefore that testing sera should be standardized by immunizing animals with heated suspensions, by the use of a definite species of animal for their production and that they should be accompanied by the culture used for immunization as control.

W. F. Harvey.

QUENARDEL. Vaccination anticholérique. Echec de la méthode à Siemréap. [**Failure of Anti-Cholera Vaccination.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1931. Oct. Vol. 9. No. 9. pp. 718–721.

The author reports an outbreak of cholera which lasted from the middle of June to the end of July 1931. There were 36 cases with 29 deaths—of these 7 were prisoners in the Siemreap Jail, Cambodia. All these cases had been inoculated with anti-cholera vaccine, 4 of them with two doses of 1.0 cc. and 2.0 cc. with an interval of eight days and 3 with only one injection when attacked with cholera before the second could be given. In the discussion which followed, Dr. SONCHARD pointed out that these cases did not warrant pessimistic conclusions concerning the value of anti-cholera vaccine. No known vaccine of any kind gave

absolute protection to everybody and the value of vaccination can only be judged by comparing large numbers. He gave instances where statistics showed the value of vaccination.

J. H. T. W.

MAITRA (G. C.) & AHUJA (M. L.). **Note on the Probable Causes of Unpleasant Reactions following Prophylactic Cholera Inoculation, with Special Reference to Certain Avoidable Factors.**—*Indian Jl. Med. Res.* 1931. July Vol. 19. No. 1. pp. 159–162. With 3 figs. on 1 plate. [2 refs.] [Central Research Inst., Kasauli.]

Many thousand doses of cholera and prophylactic T.A.B. vaccines are sent out from Kasauli every year. Although the bulk of the supply is for the army a considerable quantity of these vaccines is used by the civil population of British India and the Indian States. In spite of the stringent precautions taken during manufacture and storage, it is not unusual to get occasional complaints that particular capsules of vaccine produced severe and general reactions after injection. Such complaints most often refer to the cholera vaccine, particularly from civil practitioners who generally use a single dose of 1·0 cc. for individual instead of an initial dose of 0·5 cc. followed by 1·0 cc. after ten days' interval. Want of asepsis, blunt needles, etc., might cause trouble, but such points cannot be checked at the source of manufacture. The following possibilities were investigated: (1) Impure and contaminated vaccine. All samples supposed to have caused unpleasant results were examined culturally and found free from contamination. They were also examined microscopically with appropriate staining and showed nothing but the organisms that had been used originally; (2) Excessive dosage due to errors in standardization. Cholera vaccines, eight times as strong in bacterial content as those used for preventive inoculation in man, have no severe local or general effect when injected subcutaneously into guineapigs; (3) Excess of carbolic acid used as preservative. A vaccine of standard strength with 1·0 cc. carbolic acid added injected into 3 human volunteers and 3 guineapigs produced no more reaction than the vaccine to which 0·5 cc. is added; (4) Excess of foreign proteins (other than bacterial protein) such as peptones, proteoses and other nutrient materials together with certain products of bacterial metabolism. A twenty-four hours' broth culture of vibrios is planted on rolled trypsinized casein agar. The bottles are incubated at 37° C. for 24 hours and the resulting growth is washed off with normal salt solution and decanted into sterile test-tubes 6 inches by 1 inch. These washings contain a certain amount of the nutrient material. The washings stand for 48 hours to allow the bacteria to be deposited and the supernatant fluid is then decanted off. If there should be any carelessness at this step an excess of protein may get into the vaccine. Vaccine with excess of supernatant fluid produced in 3 volunteers severe local reactions and fever. They could not return to duty for 2 days. In another 3 moderate reactions only. This same vaccine produced, when injected into 2 guineapigs, redness, oedema and local necrosis after 24 hours. Cholera vaccine prepared from the bacterial deposit and containing the minimum possible amount of nutrient material would reduce to a very considerable degree untoward reactions following prophylactic inoculations.

J. H. T. W.

MAITRA (G. C.) & AHUJA (M. L.). **A Comparative Study of the Efficiency of Cholera Vaccine stored in a 'Frigidaire' at 4° C. and in a Biological Incubator at 37° C.**—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 957-962. With 1 graph in text. [Central Research Inst., Kasauli.]

The authors state that owing to the difficulty associated with the production of cholera in experimental animals and the debatable part played by complement deviating bodies, haemolysins, opsonins, etc., as defensive factors in a serum, they have used agglutinogenic response as the index of antigenic findings.

The agglutinogenic power does not apparently diminish with storage at 37° C.

W. F. Harvey.

YOSHIZUMI (Tai). **Supplement to the Knowledge of the Bacteriophage Active for Cholera Vibrio.**—*Japanese Jl. Experim. Med.* 1931. Aug. 20. Vol. 9. No. 4. pp. 353-358. [11 refs.] [Govt. Inst. for Infectious Diseases, Tokyo.]

The classification of cholera vibrios in terms of bacteriophage action adopted by the author is that of NOBECHI and is :—(1) non-lysogenic susceptible; (2) non-lysogenic resistant; and (3) lysogenic resistant strains. Out of 42 strains of vibrio which were placed under test, four were found to be lysogenic, that is to say capable on cultivation of producing the lytic agent. These four strains were in every way typical cholera vibrios and were themselves resistant to the lytic agent whatever might be its derivation. It may be laid down that the lytic agent derived from a lysogenic strain of cholera will act on certain cholera vibrios but not on all. Of the remaining strains of cholera vibrio 12 were non-lysogenic resistant and 26 non-lysogenic susceptible.

W. F. Harvey.

MAITRA (G. C.) & MALLICK (S. M. K.). **Experimental Observations on Cholera 'Phage Lysate as a Component of Prophylactic Cholera Vaccine.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 701-704. [5 refs.] [Central Research Inst., Kasauli.]

Vibrios which have been lysed by bacteriophage when injected subcutaneously in the rabbit produce neither any symptoms nor any immunity to subsequent test by intravenous injection of 1½ times the minimal lethal dose of killed cholera organisms. It was also found that the addition of cholera 'phage lysate to cholera vaccine did not add anything to the antigenic power of the latter.

W. F. Harvey.

PASRICHA (C. L.), DE MONTE (A. J.) & GUPTA (S. K.). **Mutation of Cholera-like Vibrios under the Action of Bacteriophage. (Lysability of Cholera-like Vibrios by Pure-Line Races of Cholera Bacteriophage and Changes induced in the Serological Reactions of Cholera-like Vibrios under the Influence of Bacteriophage.)**—*Indian Med. Gaz.* 1931. Nov. Vol. 66. No. 11. pp. 610-618. [23 refs.] [School of Trop. Med & Hyg., Calcutta.]

Comparisons between cholera and cholera-like vibrios and attempts to identify them or to change the one into the other have been made by

many workers ever since the cholera vibrio was discovered. This subject has now been approached by the authors from the point of view of apparent transformations effected in the course of lysis by bacteriophage. Their work may be summarized as follows:—

The pure-line cholera 'phages type A, B and C, were used in test and it was found that none of the 355 strains of non-agglutinating cholera-like vibrios was lysed by type A. This type is capable only of lysing smooth forms of the cholera vibrio. Types B and C on the other hand, either singly or together, caused lysis of 73 of the strains. Some of the non-lysable strains became lysable by culture on an increasingly alkaline medium. Agglutinability was also found to be a characteristic of some of the secondary resistant colonies which developed after 'phage action. These were not only agglutinable but were capable of absorbing agglutinin completely from a cholera type-serum. The agglutinability was difficult to maintain on subculture. Finally they conclude that there is some bacteriophage and serological relationship between the true cholera vibrio and the cholera-like forms. Many of these latter they think to be mutation forms of the true cholera vibrio and to play a great part in the etiology of the disease.

W. F. Harvey.

PANAYOTATOU (Angélique). Les phénomènes d'hématolyse et d'hémo-agglutination par les vibrions. [**Haemolysis and Haemagglutination by Cholera Vibrios.**]—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 907-909. [1 ref.]

——. Le phénomène d'agglutination des vibrions. Quelques expériences biologiques sur quatre souches de vibrions de l'épidémie de choléra à Basrah. [**Some Experiments on the Agglutination of Cholera Vibrios from a Basrah Epidemic.**]—*Ibid.* pp. 909-911. [Chatby Quarantine Lab., Alexandria.]

In the first paper there is described the phenomenon first of agglutination and then haemolysis of guineapig erythrocytes by cholera vibrios. In the second paper the author confirms the fact that vibrios, which are agglutinated by high dilutions of cholera serum on isolation, may in time lose their agglutinability.

W. F. Harvey.

KITASHIMA (Taichi) & WATANABE (Yoshimasa). **On the Types of *Vibrio cholerae* which invaded Japan.**—*Kitasato Arch. Experim. Med.* 1931. July. Vol. 8. No. 3. pp. 195-233.

In this article the authors review the types of cholera vibrio found in epidemics from the first identification of the organism two years after its discovery by Koch to those occurring in epidemics in Japan at the present day.

W. F. Harvey.

JOURNAL OF THE PUBLIC HEALTH ASSOCIATION OF JAPAN. 1931. Sept. Vol. 7. No. 9. pp. 4-5. Cholera on Board S.S. Cathay.

MORGAN (M. T.). L'épidémie de choléra en Irak dans l'été 1931.—*Bull. Office Internat. d'Hyg. Publique.* 1931. Dec. Vol. 23. No. 12. pp. 2165-2174. With 1 map in text.

YAWS AND SYPHILIS.

BUTLER (G. G.) in collaboration with SUMMERHAYES (G. M. L.). **Some Observations bearing on Yaws and Syphilis in Expectant Native Women attending the Maternity Hospital in Accra, Gold Coast.**—*West African Med. Jl.* Lagos. 1931. Oct. Vol. 5. No. 2. pp. 19–28.

The object of the investigation here reported was to attempt to estimate the prevalence of syphilis among expectant African mothers. The serum W.R. of expectant or recently delivered women at the Accra Maternity Hospital was tested together with W.R. of blood from the placental end of the cord and a histological examination of the placenta was carried out. The method used for W.R. was No. 4 of the Medical Research Council. The statistics refer to 450 women among whom the W.R. was positive in 32·5 per cent. Among those giving a history of yaws it was positive in 62·8 per cent. and negative in 79·7 per cent. of those denying yaws.

To 285 women in past pregnancies were born 838 living and 63 still-born children and there were 49 miscarriages and of the living 279 had died subsequently.

To 445 women in present pregnancy were born 404 living and 61 still-born children and 3 miscarriages. There were 27 deaths among the infants before leaving the hospital.

"From 445 women, with 1,393 pregnancies, 1,418 results have been recorded, the main features of which are 89 per cent. infants born alive and 8·8 per cent. still-births; and this is occurring in approximately a 30 per cent. Wassermann positive population, which is wholly untreated for all practical purposes. Among these 445 women, after excluding primipara and certain cases with incomplete histories, only 4·4 per cent. are regarded as presenting bad previous histories. When these are examined in detail there is about as much evidence against syphilis as in favour of it as the cause of the bad histories. When further search is made among the still-births it is found that about double the number of still-births arise among Wassermann positive as among Wassermann negative mothers but when the causation of these still-births is taken into account, there is apparently very little evidence to point to syphilis as being the incriminating factor though that hypothesis is suggested again by the high Wassermann rate in parallel with a low positive yaws rate revealed amongst the still-births arising from mothers with bad previous histories."

Further analysis of data "would seem to indicate that the Wassermann positive rate and yaws positive rate is approximately similar and at the normal level whatever the end result of the pregnancies may be except in a very small group labelled 'still-births without obvious cause.' There is an indication also that 'prematurity without obvious cause' is not influenced by the Wassermann and yaws positive rate of the mothers, but that it runs in relationship with the malaria positive rate. Nor does the progress of the infants appear to be influenced by the Wassermann positive or yaws positive condition of the mothers except in a very small group labelled 'died soon' where there is a deviation of these two factors from the normal levels and is suggestive of the presence of syphilis. There is not a very wide divergence in the progress of the infants born at full term and those 'premature without obvious cause,' which suggest that the malaria infestation of the mother in the premature group is not causing much if any harm to the infant, and this is confirmed by the satisfactory progress of these infants when compared with an equal sized consecutive group from non-malarial mothers."

"Owing to the infrequency with which obvious syphilis is seen in a

local African community, that is heavily gonorrhoea and yaws infected, a problem seems to be presented, for it would seem that syphilis should be as rampant as gonorrhoea. Owing to the presence of yaws the value of a serological test alone is almost useless.

"The explanation why syphilis should not be obvious everywhere seems inexplicable, but there remains the possibility of a cross immunity from yaws.

"The importance of knowing the position cannot be over-estimated, for syphilis can only be adequately controlled in its earliest manifestations. If, however, yaws is conveying a cross immunity it must definitely affect our procedure in yaws and antenatal campaigns if a positive Wassermann reaction is any indication of an immunity. The evidence available to indicate the presence of syphilis in the apparent absence of the ordinary direct manifestations would seem likely to be best observed in possible effects on pregnancy and the health of the new born, that is in ante-natal and post-natal mortality; and it is on the statistics from the Maternity Hospital balanced against certain laboratory examinations that the present line of study has been made. The method of approach has been to superimpose 'maps,' as it were, of the results of pregnancies, histories of previous pregnancies and the progress of the infants upon other 'maps' of the Wassermann reaction and yaws history, in order to see where there is deviation or overlapping in the various features that are suggestive of the action of syphilis.

"The results have been almost uniformly negative and indicate that there is probably in this study not more than about one case which recurs on these 'maps,' and is highly suggestive of syphilis. If the deductions are sound, what is the explanation, and can it mean a cross immunity? The Wassermann positive rate and the yaws history rate run at about a 30 per cent. level throughout most of statistics obtained for the results of pregnancies. The one group in which there is a deviation from this level is among certain still-births, but the group is a very small one, namely 2.7 per cent. for a wholly unprotected and untreated population, the measure of whose opportunity of acquiring syphilis must be high if judged by gonorrhoeal infections. This group of still-births is only about a fifth of the actual cases of still-births, and it may not be improbable that ecobolism and deliberate violence are important factors in their causation, so that it may be quite unfair to judge a previous history on the occurrence of a still-birth or two.

"The Wassermann reaction on cord bloods shows 5 per cent. as being positive, but there is every indication that it is a passive filtering over of Wassermann reacting substances from the maternal circulation, for they disappear very soon in the infant blood in those few cases in which a re-examination has been made.

"No indication whatever of syphilis has been obtained in the examination of placenta."

H. S. Stannus.

BUTLER (G. G.). **Some Observations bearing on Yaws and Syphilis.**—*Gold Coast Rep. of Laboratory Services Year 1929-1930.* Appendix D. pp. 34-37.

Dr. Butler draws attention to the low records of primary sore and congenital syphilis (a common observation among native races) and believes this must mean that the disease (syphilis) is either rare or unreported. An attempt was made in association with Dr. SUMMER-HAYES working at the maternity hospital to arrive at some idea of the incidence of syphilis and yaws in pregnant women and their infants. The numbers were small and Dr. Butler states in his conclusion—"If I may make any deductions from these very incomplete lines of enquiry they are that about 30 per cent. of the maternity hospital

cases examined show positive W.R. but that only about one tenth of this is likely to be caused by syphilis " . . . and that " the W.R. in infants at birth in a yaws infected country is not as useful a procedure as the same test at a later date."

H. S. S.

WILKINSON (W.). **Syphilis and Yaws in South Kavirondo.**—*Kenya & East African Med. Jl.* 1931. Sept. Vol. 8. No. 6. pp. 164-171.

Some rather discursive observations upon these two diseases in Kenya from which the following points have been gleaned. The author believes syphilis " to be one of the main contributory factors in the appallingly high infant and child death rate." Congenital syphilis is however, uncommonly seen and no case presenting Hutchinson's teeth was observed, the reason being it is suggested " that affected children die either at birth or shortly afterwards." " It is quite common for a woman to say that her baby was born all right but that a few days afterwards its liver swelled up and it died. This may be due to syphilis " [but it sounds rather unlikely].

Primary chancres are seldom seen and in those recorded the author was unable to demonstrate spirochaetes by the Indian ink method. He found difficulty in many cases in knowing whether he had to deal " with multiple chancres or the secondary rash, or some other disease." Secondary lesions appear often to be limited to condylomata. Tertiary lesions are difficult to diagnose from lesions due to yaws. It is noted that bismuth injections have become so popular that many natives seek treatment with no suggestion that they have had syphilis!

Yaws is said to have existed (in the Luo country) for 20 years only. These people give a high percentage of positive W.R. and yaws is gradually dying out. No yaws was seen among the Watende, a tribe which " bedaubes itself with red clay." Among the Kisii, however, the disease is spreading. The mother-yaw is commonly sited on the perineum and genitalia, thought by the natives to be due to sitting upon infected spots. A yaw on the sole of the foot has not been seen. A few cases of gangosa are recorded but none of J.A.N. Periosteal nodes are common but sabre tibiae rare.

H. S. S.

FITZGERALD (G. H.) & DEY (Nepal Chandra). **The Manifestations of Chronic Yaws.**—*Indian Med. Gaz.* 1931. Aug. Vol. 66. No. 8. pp. 425-430. With 5 text figs. [7 refs.]

The authors think the manifestations of yaws to which their article is devoted receive but scanty reference in text-books and believe a description of these conditions will help others to recognize the disease. Descriptions, with some good photographs, are then given of secondary eruptions on the soles and hyperkeratosis, both classed as " clavus (crab yaws)," ringworm yaws described as a squamous framboeside indistinguishable from *tinea circinata*, leucoderma and keloid. Juxta-articular nodules occurred in 3·5 per cent. of their 400 cases, but goundou in only 0·75 per cent. and a single case of gangosa only was seen. Bony lesions and tertiary ulcerations were found in 8 per cent. of patients.

H. S. S.

CONNELL (W. K.). **The Origin and Development of Bismuth Therapy in Yaws.**—*Kenya & East African Med. Jl.* 1932. Jan. Vol. 8. No. 10. pp. 270-279.

The subject matter of this paper is already known to readers of the *Bulletin* save perhaps the results of an investigation carried out by Dr. J. W. GRAHAM at the instance of the Colonial Medical Research Committee in an attempt to test under scientific control the relative efficiency of five different bismuth preparations in the treatment of yaws.

Although certain conclusions were suggested, it is obvious that, from what Dr. Connell says, Dr. GRAHAM was not given the facilities for carrying out the investigation in a proper way and the results can only be looked upon as before as opinions and then only as opinions in regard to the clearing up of the lesions present at the time, what has been called "clinical cure" or better described by the French as "blanchissement."

H. S. S.

SCHÖBL (Otto). **Further Experiments concerning Immunity in Treponematous Infections.**—*Philippine Jl. Sci.* 1931. June. Vol. 45. No. 2. pp. 221-231. With 1 text fig. [8 refs.]

The further animal experiments detailed in this article confirm previous findings. Intramuscular or intratesticular inoculation of monkeys with syphilis without formation of apparent lesions, initial or generalized, immunizes against cutaneous inoculation with yaws. Immunity develops in about the same time as it does when intradermal inoculation with syphilis is performed and an initial lesion is seen. Intra-meso-dermal inoculation with yaws, without production of skin lesion, confers immunity to yaws earlier than does intradermal inoculation with lesion formation. Dead yaws and syphilis antigen confers a high degree of antitreponematous immunity.

Intra-meso-dermal inoculation of treponema antigen performed on early cured yaws monkeys hastens the development of antitreponematous immunity. It prevents subsequent reinfection and development of late stages.

While intradermal superinfection with yaws does not accelerate the immunity induced by the primary lesion in the course of an infection, intra-meso-dermal superinfection with yaws, like generalized yaws or vaccine therapy or superinfection with mesodermotropic treponema of syphilis, accelerates the development of immunity to yaws.

H. S. S.

- i. SCHÖBL (Otto). **An Interpretation of the Laws of Brown and Pearce that Govern the Course of Treponematoses.**—*Philippine Jl. Sci.* 1931. Oct. Vol. 46. No. 2. pp. 169-175. [7 refs.]
- ii. ——. **Coexistent Infection with Yaws and Syphilis.**—pp. 177-181. [3 refs.]
- iii. ——. **The Prospects of Vaccination and Vaccine Therapy in Treponematoses.**—*Ibid.* pp. 183-187.

i. The two laws are :—(a) The law of inverse proportions : the more intense the early manifestations the less intense the late manifestations. The author shows that this is true in yaws as in syphilis and interprets

it as expressing a direct proportion between the quantity of treponematosus antigen dead or alive and the degree of immunity and spread of its development; (b) The law of sequence: various systems of tissues are affected successively. This law has little application in yaws owing to the epidermotropic tissue selectivity of the parasite. The law in regard to syphilis the author interprets as a successive development of immunity in the various body tissue systems.

ii. A discussion upon homologous and heterologous immunity in yaws and syphilis in relation to the possibility of the co-existence of both infections in the same animal or person. A reasoned argument against the theory of the unity of the two diseases which cannot be condensed.

iii. The author here discusses the evidence adduced from his experimental production of immunity against yaws and syphilis in animals in order to appraise their value as practical possibilities in the treatment of these diseases in man. He suggests that his findings warrant the belief that inoculation with dead antigen during the early stage of exaggerated tissue reactivity will accelerate the onset of immunity and prevent the occurrence of late lesions and also could be used as a preventive measure.

H. S. S.

MONSERRAT (Carlos). **Comparative Serologic Study of Vernes, Wassermann, and Kahn Reactions in Experimental Treponematoses.**—*Philippine J. Sci.* 1931. Oct. Vol. 46. No. 2. pp. 241–246. [3 refs.]

" 1. In Philippine monkeys inoculated with yaws or syphilis, the Vernes reaction was found regularly positive.

" 2. This fact shows the sensitiveness of the reaction of Vernes, which is a precipitation reaction. It is known that precipitation reactions (Kahn) are not as pronounced in Philippine yaws or syphilitic monkeys as the Wassermann test.

" 3. This is particularly evident in sera with a low and a moderate degree of positive reaction, whether compared with Wassermann or Kahn reaction.

" 4. Sera from infected Philippine monkeys giving high positive values with Wassermann reaction likewise give high values with Vernes reaction, unlike those with Kahn.

" 5. With regard to Philippine monkeys the Vernes reaction seems to have an advantage over both the Wassermann and Kahn tests."

H. S. S.

AARS (Charles G.) & NIELSEN (Frants O.). **The Cholesterol Content of the Blood Serum in Yaws.**—*Arch. Dermat. & Syph.* 1931. Sept. Vol. 24. No. 3. pp. 418–429. With 3 charts. [3 refs.]

ROSEN and KRASNOW using the modified method of Myers and Wardell showed that in syphilis there was a marked tendency to hypocholesteremia, the lowest values being found in untreated primary syphilis, the highest values in tertiary syphilis.

The present authors using the method of Bloor made a series of determinations of cholesterol in the blood of healthy inhabitants of Dutch Guiana, then among unselected patients and in cases of yaws, mostly children; 4 cases of primary yaws, 53 of secondary and 10 of tertiary disease were examined. 3 were Europeans in the secondary group, the rest were Javanese, British Indians, Negroes and Creoles.

The results resembled the findings in syphilis. During specific treatment with improvement in other directions an increase in the blood cholesterol is observed.

H. S. S.

BUTLER (C. S.). De la tréponématose en marge des rapports du pian et de la syphilis. [**The Relations of Yaws and Syphilis.**—Reprinted from *Ann. Dermat. et Syph.* 1931. Nov. 7th Ser. Vol. 2. No. 11. pp. 1188-1195.

In this short article, Captain Butler covers the same ground as in other recent notes published elsewhere and noticed in this *Bulletin*.

H. S. S.

GILKS (J. L.). The Incidence and Character of Syphilis and Yaws in Kenya.—*Kenya & East African Med. Jl.* 1931. Aug. Vol. 8. No. 5. pp. 131-142. With 3 charts. [7 refs.]

GILLAN (R. U.). The Treatment of Yaws and Syphilis.—*Kenya & East African Med. Jl.* 1931. Dec. Vol. 8. No. 9. pp. 246-255.

HASSELMANN (C. M.). Yaws and Syphilis. Problems, Clinical Studies and Experimental Evidence concerning their Relationship.—*China Med. Jl.* 1931. Dec. Vol. 45. No. 12. pp. 1131-1155. With 9 figs. on 6 plates. [21 refs.] [St. Luke's Hosp. Dispensary, Manila.]

UNITED STATES NAVAL MEDICAL BULLETIN. 1932. Jan. Vol. 30. No. 1. pp. 62-65.—Controversies on Yaws—Syphilis Relationship and Origin of Syphilis.

A reproduction of a letter of Dr. STANNUS from the *Lancet* and Capt. Butler's comments thereon.

CLIMATIC BUBO AND LYMPHOGRANULOMA INGUINALE.

BUSCHKE (A.), BOAS (A.) & VASARHELYI. Klinische und experimentelle Erfahrungen über Lymphogranuloma inguinale. [**L.I. : Clinical and Experimental.**—*Med. Klin.* 1931. Oct. 23. Vol. 27. No. 43 (1402). pp. 1562-1565. [7 refs.] [Rudolph Virchow Hosp., Berlin.]

The authors refer to the growing number of cases of L.I. which have come under their observation. They originally published notes on 13 cases; subsequently up to October 1931, 33 other cases were seen. Since that date a further 26 cases have come under their care. They point out the necessity of taking a wide view of this infection; the disease as it used to be known under the name of climatic bubo was too circumscribed in its description. New points come to light and must be noted.

It is agreed that the portal of infection is commonly the genital area, though the inoculatory lesion may not be observed. This lesion has commonly been described as a small herpetiform erosion with no induration and little discharge. It generally heals spontaneously but it may break down again or there may be a true erosive ulcer most often found in the coronal sulcus which will spread on to the inner surface of the prepuce with a certain amount of induration due to lymphatic infiltration. A gangrenous process difficult to control may also occur. In these cases mixed infection with syphilis and phagedaena were naturally considered but bacteriological and serological investiga-

tions were negative, while Frei's reaction was positive. In all their cases the gland involvement was typical, in some retrogression took place spontaneously, in others softening occurred. Among other anomalous cases one is mentioned of a man who 3 weeks after cunnilingus developed two small lesions on the side of the tongue and in 5 weeks an enlarged gland mass in the neck—a case which will be published in full elsewhere. Antigen prepared from the gland gave a positive Frei reaction in the patient himself and other cases of L.I.; controls being negative. Other extragenital infections have been noticed by KLOTZ, HELLERSTRÖM and FAVRE.

The disease must be regarded as a truly general infection; generalized symptoms are not uncommon; there is prolonged fever, enlargement of the liver and spleen, rheumatic manifestations and exanthems resembling erythema nodosum and erythema exudativum multiforme, as noted by HELLERSTRÖM, FREI, KLEEGER and KITCHEVATZ. KLEEGER found that extracts made from the skin efflorescence would give positive skin reactions.

A case is detailed of a man seen 5 weeks after coitus suffering with fever and enlargement of groin glands for 3 weeks. There was a discharge from the urethra (as in CURTH's case, urethral lesion) but W.R., Dmelcos reaction and examination for gonorrhoea were negative while Frei's test was strongly positive. The case ran a long course; in the second month, there were acute abdominal symptoms—constipation, pain and tenderness, leucopenia, albuminuria and a secondary anaemia associated with a large mass of glands in the lower abdomen. Later, knee and shoulder joints and joints of hands and feet were swollen and slightly reddened with pain on movement and further rise in temperature; both shins showed typical erythema nodosum. The iliac glands were more greatly swollen, the spleen enlarged, and on the neck a papulo-macular rash appeared with bleb formation. In this case of generalized disease detoxin given intravenously was followed by rapid improvement in all signs and symptoms.

Another case worthy of note was one of obvious syphilis. Spirochaetes were found and the W.R. was positive. Dmelcos test was negative as also was the Frei reaction. Later the groin glands swelled and the Frei reaction became positive.

The results of animal inoculations from some of their cases are given but need no mention here.

H. S. Stannus.

NICOLAU (C. T.). Modifications hématologique dans le lymphogranulome inguinal bénigne (maladie de Nicolas et Favre). [**Blood Changes in L.I.**].—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1931. Apr. Vol. 13. No. 4. pp. 45–50. With 2 charts in text. [2nd Med. Clinic, Faculty of Med., Bucharest.]

After briefly referring to the clinical picture of L.I. in its acute form and in the form with more gradual onset and to the findings of others in regard to the blood formula, the author gives the results of his own observations upon forty cases in which the diagnosis was confirmed by the intracuti-reaction of Frei.

There is a leucocytosis varying from 8,000 to 27,000, which apparently has no relationship with the temperature or other clinical manifestations. The differential white count varies a good deal, corresponding with the reactions between antigen and the tissues. The counts represent a series of events in the evolution of the inflammatory process: period of attack, neutrophilia; of defence, eosinophilia and monocytosis; or

cure, lymphocytosis. The sedimentation test showed marked acceleration in all cases. The refraction index of the serum is raised—55-72.

H. S. S.

- i. MEYER (Kurt) ; ROSENFELD (Herbert) ; ANDERS (H. E.). Erfolgreiche Übertragung des Lymphogranuloma inguinale auf Meerschweinchen. I. Experimenteller Teil [MEYER & ROSENFELD].—*Klin. Woch.* 1931. Sept. 5. Vol. 10. No. 36. pp. 1653-1655. II. Ueber Histogenese und Pathogenese des auf das Meerschweinchen uebertragenen Lymphogranuloma inguinale [ANDERS].—*Ibid.* pp. 1655-1658. With 4 text figs. [10 refs.] [Rudolf Virchow Hosp., Berlin.]
- ii. FREUND (Helmut) & REISS (Franklin). Übertragung des Lymphogranuloma inguinale (Nicolas-Favresche Krankheit) auf Kaninchen und Meerschweinchen. [**Transmission of L.I. to Guinea-pigs and Rabbits.**].—*Ibid.* pp. 1658-1659. [7 refs.] [Skin Clinic, Univ., Berlin.]

i. The authors record constant successes in inoculation of guinea-pigs with pus in 0.5 to 1.0 cc. doses from cases of L.I. injected into the inguinal region after subjecting the local lymphatic glands to bruising. In 48 hours some induration can be felt, in 10 days a lesion the size of a cherry ; this later diminishes leaving only a small pea-sized hard gland. If the animal be killed 8-10 days after inoculation periglandular haemorrhagic infiltration is revealed and sometimes necrosis or caseation in the gland. If it is killed later, an extension of the process is observed, the iliac glands are affected on the same side and the mesenteric glands may be involved, with caseation in some cases. The spleen may be enlarged and the liver and lungs also affected, showing macroscopically small infiltrations white in colour and the size of a pin's head.

The histological changes, dealt with at length by H. E. Anders, resemble those of the human disease, and are characteristic. From nine out of ten cases of L.I. successful inoculations were made into nineteen out of twenty-two guinea-pigs.

Subinoculations on ten occasions were all successful and third passages were obtained. Extracts of liver and lung were used in some cases as the inoculum. One strain was carried through twelve successive animals, but there is some evidence that subinoculation is accompanied by decreasing virulence. The virus in preliminary experiments was shown to be a filter-passer and to be resistant to heat and glycerine. All the original patients gave positive skin reactions to antigen prepared from the tissues of the infected animals.

ii. Successful results have followed subdural inoculation of rabbits with material from cases of L.I. There is produced a characteristic meningo-encephalitis, that can be passaged from one animal to another, an extract of brain substance from an infected animal producing lymphatic changes in a second animal when inoculated as easily as when the inoculum consists of pus from a case of L.I. Inoculation into a gland of gland or brain extract from an infected animal produces clinical, histological and biological results comparable to inoculation of human material.

The disease can be subinoculated into guinea-pigs from rabbits and vice versa or from one animal to another of the same species.

H. S. S.

HELLERSTRÖM (Sven). Experimentelle Untersuchungen über Lymphogranuloma inguinale. [**Experimental Researches on L.I.**]—Reprinted from *Dermat. Ztschr.* 1931. Vol. 61. pp. 395-399.

Numbers of observers have in the past described organisms as possible etiological factors in L.I. but they have all been discredited. In the same way many attempts to infect animals failed. A change in technique however, was followed by success; the disease can be carried on in monkeys by intracerebral injection. In the monkey intracerebrally inoculated with gland juice from a case of human L.I. a characteristic leptomeningitis with polymorph, endothelial and plasma cell infiltration is produced. In some animals the disease is a rapidly fatal one, in others it is more chronic and in some no symptoms occur. If the last mentioned be killed the characteristic change will still be found. No organisms can be discovered but the disease can be passaged in monkeys and has thus been propagated up to the 15th passage. An antigen prepared from the brain and meninges of these monkeys gives a positive Frei cuti-reaction in human cases of the disease, all controls being negative. A few animals have apparently survived the disease and become reinoculable. These results were communicated at the Dermatological Congress at Copenhagen. LEVADITI and others have had similar results and all go to show that L.I. is due to a virus which can be obtained from the affected glands in human patients and communicated to monkeys. Hellerström and WASSÉN continuing their investigations have shown that in material kept in sterile glycerine up to seven days the virus may remain active but after that period virulence disappears. Any influence the pH may have has not been worked out. In one out of a few experiments a Berkefeld filtrate gave a positive result but the filtrability of the virus is not yet properly established; results, however, suggest an ultra-microscopic virus comparable with other ultramicroscopic viruses.

As regards treatment, in a single case the antigen of Frei was used, in a 1 in 8 dilution heated to 60° C. and with 0.5 per cent. added phenol; 0.2 to 5.0 cc. given intravenously every day and later every second day was well supported and noticeable improvement occurred in a week.

H. S. S.

- i. LEVADITI (C.), MARIE (A.) & LÉPINE (P.). Conservation de la virulence du virus lymphogranulomateux.—*C.R. Soc. Biol.* 1931. Sept. 18. Vol. 107. No. 26. pp. 1496-1497. [3 refs.]
- ii. —, RAVAUT (P.), LÉPINE (P.) & SCHOEN (R.). Etude expérimentale du virus de la lymphogranulomatose inguinale. [**Study of the Virus of L.I.: its Preservation.**]—*Ibid.* pp. 1525-1527. With 1 chart in text. [2 refs.]

i. The authors considered it would be interesting to ascertain whether the virus of L.I. (which has been shown by HELLERSTRÖM and WASSÉN to affect the central nervous system in monkeys) might have a possible therapeutic effect in cases of general paralysis, especially those which are refractory to other therapeutic infections.

A 35 year old case of typical G.P.I., resistant to malarial infection, was inoculated (5th June) intradermally, on the inner surface of the prepuce with 0.1 cc. of a brain emulsion from a cynocephalus monkey which had died on the seventh day after transcranial inoculation with the "Kam" strain of virus at its 12th passage through monkeys. After

an incubation period of 35 days, during which there was nothing to record, typical swelling of the inguinal glands became evident. The virus therefore of L.I. preserves its virulence for man after 12 passages through monkeys inoculated intracerebrally. Further results will be reported in due course.

ii. During the routine experiments made upon the infection with the virus of L.I. in monkeys, the following observations have been made. *Macacus cynomolgus*, *M. inuus*, *Cercopithecus callitrix* [*? callitrichus*] and *Cynocephalus babuin* are all susceptible, more especially the last mentioned. Death ensues between the 5th and 26th days, more generally between the 5th and 12th days. The virus rapidly loses its pathogenicity outside the body, as when fragments of brain tissue are kept in glycerine at 2° C. Simply kept in an ice chest the maximum preservation of pathogenicity is ten days. Dried virus cannot be preserved any longer time. Intracerebral inoculation of the white mouse induces no clinical disease in that animal but if it is killed pathological changes resembling those found in monkeys may be demonstrated and intracerebral inoculation of a monkey with an emulsion of the brain of a mouse killed on the 5th day caused infection of the monkey. (In a later experiment it was shown that the virus remained active in the white mouse up to 22 days.) Experiments were carried out to determine whether neutralization of the virus of L.I. can be effected. It was found that the serum from a human patient who had been suffering from the disease for several months was capable of neutralizing the virus *in vitro* and that all controls were negative.

H. S. S.

LEVADITI (C.), RAVAUT (P.), LÉPINE (P.) & SCHOEN (R.). Etude étiologique et pathogénique de la maladie de Nicolas et Favre (lymphogranulomatose inguinale subaigue, ulcère vénérien adénogène, poradénolymphite). [**Etiological and Pathological Study of L.I.**].—*Ann. Inst. Pasteur*. 1932. Jan. Vol. 48. No. 1. pp. 27–88. With 7 coloured figs. on 1 double plate, 27 figs. & 1 chart. [Refs. in footnotes.]

This contribution, by Levaditi and his co workers, forms almost a monograph upon the nature of the virus, the pathogeny, the histopathological findings in man and experimental animals and the virucidal properties developed in the serum. It is impossible to summarize and should be read by all those interested in the disease.

H. S. S.

LEVADITI (C.), RAVAUT (P.), LÉPINE (P.) & CACHERA (R.). Propriétés virulicides du sérum de sujets atteints de la maladie de Nicolas et Favre. [**Virucidal Properties of the Serum of L.I. Patients.**].—*Bull. Acad. Méd.* 1932. Jan. 26. 96th Year. 3rd Ser. Vol. 107. No. 4. pp. 110–114. [2 refs.]

Recently the authors showed that the serum of a patient suffering from L.I. would neutralize *in vitro* the ultra-virus of that disease. The problem of determining the time at and the quantity in which these virulicidal substances appear in the blood was next entertained. Mixtures of patients' serum and emulsion of brain from an infected monkey were prepared with a like number of controls, the test being made by intracerebral injection of the mixture into clean monkeys.

It was shown that the serum of L.I. patients contains specific virucidal substances capable of neutralizing *in vitro* the L.I. virus and that these substances seem to appear in the blood little after the onset of signs of infection in man.

H. S. S.

SULZBERGER (Marion B.) ; DAVID (Vernon C.). **Stricture of the Rectum.** [Correspondence.]—*Jl. Amer. Med. Assoc.* 1932. Feb. 6. Vol. 98. No. 6. p. 499.

Dr. Sulzberger refers to an article by DAVID and LAUER (*Jl. Amer. Med. Assoc.* 1932, Jan. 2, Vol. 98, No. 1, p. 1) upon some unusual causes of stricture of the rectum in which it was shown that there are a large number of such cases of uncertain aetiology and that though some 50 per cent. of such cases give a positive W.R. especially in negro women, other cases seen in white women have shown no evidence of syphilis. The writer then suggests that these cases probably are cases of lymphogranuloma inguinale analogous to those described by SULZBERGER and WOLF (in the *Brit. Jl. Dermat.*, now in print) such lesions being often the only clinical manifestations of the disease in women. This condition, that known as esthiomene or ulcer vulvae chronicum elephantiasticum and syphiloma anorectale generally found in women, together with elephantiasis of the penis and scrotum, all give a positive reaction with Frei's antigen. Dr. David replying states that he has seen superficial ulceration of the mucosa of the rectum as the earliest stage of the process and no enlargement of lymph glands, also ulceration of colon above a colostomy done for stricture without glandular enlargement or evidence of lymphangitis which Sulzberger has suggested was the cause of the stricture, a lymphangitis spreading from cervix and fornices along perirectal lymphatics.

H. S. S.

HELLERSTRÖM (Sven). Strumöse Bubonen verschiedener Ätiologie. [**Strumous Buboes of Various Aetiology.**]—Reprinted from *Acta Dermat.-Venereologica*. 1931. Aug. Vol. 12. No. 3. pp. 254-276. With 5 text figs. [22 refs.] [Karolin Inst., Stockholm.]

The author draws attention to the difficulties in the differential diagnosis between L.I. and other types of strumous bubo due to spirochaetal, streptobacillary and staphylococcal infections, and to this end discusses cases, their histories and histological findings.

H. S. S.

BENSAUDE (R.) & LAMBLING (A.). Le rôle de la maladie de Nicolas-Favre dans l'étiologie du rétrécissement inflammatoire du rectum. Etude de 21 cas par l'intra-dermoréaction de Frei.—*C.R. Soc. Biol.* 1931. Dec. 18. Vol. 108. No. 37. pp. 1050-1053. [1 ref.]

GRANULOMA VENEREUM.

DE MONBREUN (William A.) & GOODPASTURE (Ernest W.). **Etiological Studies of Granuloma inguinale.**—*Southern Med. Jl.* 1931. July. Vol. 24. No. 7. pp. 588-596. With 24 figs. on 4 plates. [13 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

During the past fifteen months cultures on a great variety of media have been made from six cases of granuloma inguinale in negroes, mostly women, in an endeavour to find and prove the causative

organism. In none did the authors succeed in growing an organism of the mucosus capsulatus group, or one possessing the characteristics of the Donovan body nor, regularly, any other organism. One resembling Ducrey's bacillus in many respects in association with a streptococcus was found in three cases. Attempts to infect animals by inoculations of scrapings from lesions must be looked upon as failures, except in the case of some monkeys, in whom the authors claim that "the great number of Donovan organisms present in mononuclear cells within the lesions [injection induration] and especially their arrangement in cysts corresponding in every way to those of the human cells," prove infection to have taken place with multiplication of the organism—which they consider to be the cause of G.I.

H. S. Stannus.

WILSON (Lester A.). **Pregnancy and Labor complicated by Granuloma inguinale.**—*Jl. Amer. Med. Assoc.* 1930. Oct. 11. Vol. 95. No. 15. pp. 1093-1094. With 1 text fig. [2 refs.]

Dr. Wilson, professor of obstetrics, Charleston, South Carolina, gives short notes upon 14 cases of negro women met with in five years suffering from G.I. complicating pregnancy and confinement. Three of these gave a positive blood W.R. The condition was progressively worse during the pregnancy and improved again after labour. Interference was minimal and no vaginal examinations were made, with the result that septic trouble in the puerperium was conspicuously absent.

[It is stated that the usual intravenous injections of tartar emetic were given when the patients were seen during the pregnancy but the results of such treatment are not mentioned. The fact of these women having become pregnant is of interest since it has been stated in some text books that they are rendered sterile.]

The author is of opinion that the disease is not capable of venereal transmission for none of the husbands of these 14 women was affected.

H. S. S.

SILVA (Flaviano). **Localização extragenital do granuloma venereo. [Extra-genital Granuloma venereum.]**—*Brasil-Medico.* 1931 Aug. 15. Vol. 45. No. 33. pp. 749-750.

The author refers to cases of granuloma venereum extragenitally situated previously reported by MAITLAND in Madras, and by DONOVAN, SUTTON, SEQUEIRA and others. In Brazil PEDROSO has recorded it on the lip, LUTZ and SANSON in the mouth, Silva ARAUJO on lip and cheek, and MARINHO on the soft palate.

He gives details of a patient who for 12 years had a lesion on the pubes and the genitalia. It had been treated repeatedly by injections of antimony, but had not completely healed. In addition there was a granulomatous lesion of the gum on the right side involving also the soft palate and uvula. Microscopical examination of a fragment of the latter showed *Calymmatobacterium granulomatis*. The teeth were carious and the patient had a habit of inserting his fingers in his mouth to feel them, and it is thought that infection was thus conveyed. [The later history of the case is not stated.]

H. H. S.

GREENWOOD (F. G.). **The Treatment of Granuloma Inguinale by Diathermic Fulguration. An Analysis of Twenty-Two Cases.**—*Brit. Jl. Radiology*. 1931. Oct. Vol. 4. No. 46. pp. 488-499. With 2 figs. on 1 plate. [14 refs.]

During the three years 1927-29 some 20 cases of granuloma inguinale in the Federated Malay States were treated by fulguration (details of which are given). From 1-4 courses were necessary given under general anaesthesia and the average duration of treatment was seventy days. The immediate results are good but the late results unknown as it was impossible to follow cases.

[The author, it should be noted, makes the curious mistake of not differentiating Leishman-Donovan bodies of the leishmaniasis and the so-called Donovan organism which has been found in the inguinal granulomas now being dealt with.]

H. S. S.

DEMONBREUN (W. A.) & GOODPASTURE (E. W.). **Infection of Monkeys with Donovan Organisms by Injections of Tissue from Human Lesions of Granuloma inguinale.**—*Amer. Jl. Trop. Med.* 1931. Sept. Vol. 11. No. 5. pp. 311-323. With 7 figs. on 3 plates. [3 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

Granuloma inguinale is generally considered to be a venereal disease but extragenital infections are not uncommon. There is an interesting racial and individual immunity. Whites very seldom contract the disease and negroes, among whom most cases have been observed, may escape infection even after repeated exposure. In this connexion it is pointed out that the supposed infective agent, the Donovan organism, seems to multiply mainly within the cells of the host, and the possibility of an insect vector should not be lost sight of. The variable incubation period of 2 days to 3 months is also a point against sexual transmission. Histological examination shows that proliferation of granulation tissue takes place in the subcutaneous fat. It is suggested that occasionally in acute cases the Donovan organism may be carried by mononuclear cells into the blood stream to cause metastasis and this accounts possibly for peculiar extragenital localizations. Many organisms have been obtained in culture from G.I. but inoculations into animals have always failed to reproduce the lesions. Subcutaneous inoculation of laboratory animals with scrapings from human lesions resulted in localized abscesses from which Donovan organisms were never recovered.

Success has, however, been now obtained. A saline suspension of scrapings from a human lesion shown to be rich in Donovan organisms and but few others was inoculated subcutaneously into the skin of the lower eyelid of *Macacus rhesus* monkeys and the inoculation repeated 4 times in 24 days. Smears made of material aspirated from the lesions resulting from inoculation showed numerous large mononuclear cells containing cysts filled with the bacillary form of the Donovan organism with some encapsulated organisms. The lesions had completely disappeared 2 months after the last inoculation.

The authors believe they have established infection in 3 out of 5 monkeys as shown by the multiplication of the organisms and their arrangement in cysts corresponding to that seen in human lesions and pointing to multiplication.

H. S. S.

MISCELLANEOUS.

MCCARRISON (R.). **Experimental Production of Gastric Ulcer in Albino Rats.** (A Preliminary Report.)—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 61–66. [Nutritional Research Labs., I.R.F.A., Coonoor.]

Gastric and duodenal ulcers are extremely common in Southern India; hundreds of surgical operations are performed annually for their relief. Dr. SOMERVELL of the South Travancore Medical Mission is convinced that the tapioca diet of that district is related causally to the disease. Experiments were therefore made on albino rats. The average ration of a subject with duodenal ulcer in South Travancore consists of $2\frac{1}{2}$ to $4\frac{1}{2}$ lbs. of tapioca with red chillies, tamarind, rice water, fish once a day and occasionally meat. A similar diet was given to 18 young rats, and another with rice replacing the tapioca to another 18 rats. Both batches were observed for 675 days. The results were as follows:

In both groups the mortality was high, pneumonia being the chief cause of death. The growth in both groups was poor. Eight out of 17 animals on the tapioca diet, and six out of 17 on the rice diet were found post-mortem to have lesions of the stomach.

"Those fed on the tapioca diet were more subject to congestion of the stomach and to gastritis: both were liable to epithelial overgrowths at isolated areas in the proximal or squamous portion of the stomach and to ulceration of this part of the viscus. Those fed on the tapioca diet were definitely more liable to ulceration of the distal or mucous portion of the stomach. In neither did duodenal ulcer occur, though two of those fed on the 'tapioca diet' and one fed on the 'rice diet' were found at post-mortem examination to have duodenitis."

The gastric ulcers are described.

Conclusion:

"Both the 'tapioca diet,' eaten by the people of South Travancore, and the 'rice diet,' which is similar in composition to that eaten by many people in the Madras Presidency, are capable of causing gastric ulcer in albino rats. The tapioca diet is the worst of the two."

[See this *Bulletin*, Vol. 28, p. 860, where gastric ulcer in Abyssinia is attributed partly to the free use of chillies.]

A. G. B.

FROBISHER (Martin), Jr. & SHANNON (Raymond C.). **The Effects of Certain Poisons upon Mosquito Larvae.**—*Amer. Jl. Hyg.* 1931. Mar. Vol. 13. No. 2. pp. 614–622. [4 refs.] [Yellow Fever Lab., Rockefeller Foundation, Bahia, Brazil.]

Iodine killed the larvae of *Aedes aegypti*, *A. taeniorhynchus* and *Culex quinquefasciatus*, in concentrations of about one part per million, within four days. Pupae are more resistant. The general use of iodine in drinking waters is not at present recommended owing to difficulties in applying the exact concentration required, and because of possible bad effects upon the consumers; but for other water in cisterns, tanks, etc., where a transitory action is required, it may be advantageous.

W. Fletcher.

GALLIARD (H.). Infections mixtes à tréponèmes et à trypanosomes chez les animaux splénectomisés. [**Mixed Infections with Treponemas and Trypanosomes in Splenectomized Animals.**]—*C.R. Soc. Biol.* 1931. July 21. Vol. 107. No. 24. pp. 1282–1284.

The trypanosomes were *T. somaliense*; the spirochaetes *Sp. hispanica*, *Sp. crocidurae*, *Sp. duttoni*, which are only slightly pathogenic for mice. The conclusions reached were that mixed infection in splenectomized animals is little modified in duration or development except in the case of virulent spirochaetes. The antagonistic action of the spirochaetes is not reinforced. Survival is shorter if the operation on the animal was recent or took place immediately after inoculation. If however, the ablation of the spleen is remote, the resistance of the mice to the mixed virus seems to be in some degree stronger than in the controls.

A. G. B.

O'CONNOR (F. W.). Tropical Diseases and Parasitic Infections in New York City.—*Bull. New York Acad. Med.* 1931. Sept. Vol. 7. No. 9. pp. 747–750.

PITOT. La pyorrhée alvéolaire en Afrique.—*Bull. Méd. du Katanga.* 1931. Vol. 8. No. 2. pp. 33–35.

TOMS (H. W.). European Women and Children in the Tropics. [Correspondence.]—*Brit. Med. Jl.* 1931. June 20. pp. 1091–1092.

REVIEWS AND NOTICES.

MENON (T. Bhaskara) [M.D., M.R.C.P., etc.]. **An Introduction to Tropical Pathology.** With a Foreword by Major-General C. A. SPRAWSON, C.I.E., V.H.S., M.D., F.R.C.P., LL.D., I.M.S., etc.—pp. xvi+210. With 71 figs. 1931. Calcutta: Thacker's Press & Directories, Ltd. [Rs. 10s.]

This book should serve a very useful purpose. As the title indicates, it is an *Introduction* and it is designed primarily to meet the needs of the undergraduate student in the tropics. In its nature, therefore, it has to contain many statements which are dogmatic, but in an introductory book this is both necessary and advisable, for when the ground work is well and truly laid anomalies met with later are more likely to be recognized promptly and lead to deeper research.

Symptoms and signs of disease are, intentionally, barely touched upon. Misprints are every few (Oxuris is one) but two or three corrections will need to be made in nomenclature in future editions. Thus, there is evidence in favour of both *Spirochaeta pallida* and *Treponema pallidum* for the organism of syphilis, but *Treponema pallida* cannot stand; the usual name for the infective agent of seven-day fever is *L. hebdomadis*; again, *Bacillus typhus exanthematici* is, apart from accident run wild, not a valid synonym of *Proteus X 19* or *P. vulgaris X 19*; *Schistosoma* is preferable to *Schistosomum* (if *Bilharzia*, with legitimate priority, is not adopted) and *Fasciola hepaticum* is a false concord.

The penultimate chapter, Appendix I, on important laboratory methods is good, as is the last, Appendix II, with hints on performing post mortem examinations in the tropics; the former of these might be enlarged with advantage. It is a little misleading to state (p. 39) "The disease has no pathologic anatomy since it is not fatal"; has an ordinary dry pleurisy, a fractured leg or even coryza, no pathologic anatomy?

The print is good, the plates and illustrations in general are excellent. In short, the book is a good and trustworthy one within the limits which the author himself imposes, but a list of contents does not adequately compensate the omission of an Index.

H. H. S.

ALESSANDRINI (A.), PAMPANA (E.) & SABATUCCI (M.). **Gli esami di laboratorio. Tecnica e diagnostica.** [Laboratory Examinations.]—pp. xxxii+635. With 89 text figs. (5 coloured) & 3 coloured plates. 1932. Rome: Casa Editrice Luigi Pozzi. [L.50].

This book merits high praise. The task which the authors set themselves was to describe the technique of methods in general use in laboratories, not to write a manual for beginners nor to enter upon matters of mere theoretical value. They presuppose a knowledge of the elements of laboratory work and confine themselves to methods of proved utility as now in use at the Istituto di Igiene di Roma, though these are, to all intents and purposes, the same as those at most laboratories of repute.

An enumeration of the chief subjects will indicate the extensive field which is covered: Preparation of solutions of desired strength; examination of blood—cytological, parasitological, bacteriological, chemical and serological—preceded by hints for taking samples; similarly of the cerebrospinal fluid; examination of excreta, gastric contents, sputum and exudates; bacteriological diagnosis, isolation of organism, interpretation of results; protozoological, helminthological and entomological technique; skin reactions—tuberculin, Dick, Schick, melitene, echinococcus tests; preparation of vaccines, of pathological material for section; examination of water and of milk.

The reviewer has been through the book page by page and tested it again

and again, but has rarely failed to find the information sought. That it is up to date is shown by the inclusion of such matters as the Takata-Ara reaction in cerebrospinal fluid and the medico-legal application of blood-grouping; hence it is all the more strange to find no mention of trypanosomes either in blood or spinal fluid examination, nor of the Lange colloidal gold test. For hookworm culture in faeces the messy charcoal method is given; too great stress would seem to be laid on examination of the hippocampus in rabies; the reviewer used to find Negri bodies equally well in the cerebellum, pons or medulla, both in natural and experimental infection. It is only natural, perhaps, in an Italian work to find greater prominence given to and more reliance placed on non-specific agglutination and the work of ALESSANDRINI and FICAI for distinguishing *Br. melitensis* from *Br. abortus* than in English works. The entomological section is the weakest and that on water examination is sketchy, while the fluorescein and suchlike tests for leaking wells and drains hardly come under the term of laboratory examination.

In conclusion, we may say that the work is on the whole adequate, and there is no redundancy; it is eminently practical, well illustrated, handy and light to hold; it should meet with a welcome reception.

H. H. S.

LLOYD (Wray). **The Myocardium in Yellow Fever.**—*Univ. of Toronto Studies. Path. Ser. No. 8.* 172 pp. With 42 figs. (8 on plates). 1931. The University of Toronto Press.

This thesis presents in an interesting and closely reasoned manner the pathogeny and pathology of a most intriguing study—to determine the cause of bradycardia in yellow fever and to trace the significance and constancy of the degenerative myocardial lesions. Nearly all writers of theses at the present day appear to feel it incumbent upon them to give a historical introduction, which is rarely relevant. Thus whether the disease which wrought such havoc among Roman and Carthaginian troops in the 3rd century B.C., or among the Greeks in the 5th century B.C. was yellow fever or not is pure guess work and has nothing to do with the pathology of the myocardium.

The author considers first the clinical condition of the heart, familiar to all who have seen cases of this disease. The succeeding section is of the utmost interest and will well repay study; it deals with the myocardial function, describing the technical methods employed, physiological observations on the sino-atrial node and the vagus, and then on the auricular muscle and auriculo-ventricular bundle and the ventricular muscle, illustrated by series of very instructive electrocardiographic tracings. Part IV takes up the histological structure of the myocardium in the same sequence. Having thus laid the foundation the author proceeds to correlate the change and defects of function with the structural alterations revealed and finally sums up his conclusions.

In the earliest stages with the first rise of temperature the heart-beat may be increased, but very soon it begins to slow down, the muscular sounds are fainter than usual and changes registrable by the cardiograph appear; these are due to the effect of the circulating toxins on the cardiac musculature and injury to the sino-atrial node. Damage to the auricular muscle is evidenced by an inverted or reduplicated P wave; there is delay in transmission of the impulse from auricle to ventricle and degenerative changes are occurring in the auriculo-ventricular bundle. On the third and fourth days, the times when death most often takes place, the signs of deranged function are more marked. If recovery is going to ensue these signs retrogress, the P-R and R-T intervals in the electrocardiogram become longer and the conduction time begins to return to the normal. In short, the constant bradycardia is ascribable to degeneration in the sino-atrial node; abnormalities in the P wave to degeneration in the

auricular muscle ; the prolongation of conduction time of the impulse from auricle to ventricle to degeneration in the auriculo-ventricular bundle.

In animals dead of the infection well marked degenerative changes are seen in these structures and fatty degeneration, patchy, irregularly distributed, and varying in degree, is present in the muscle fibres; granular degeneration is also fairly common, hyaline less so. Small petechial haemorrhages may be seen [probably part of the wide spread petechial rash which may occur, due to endothelial changes and diapedesis.]

Eight microphotographs show, as well as such a process is capable, the outstanding histological features described, and there is a comprehensive bibliography of over 700 titles. The whole is a painstaking study of an important subject, carefully executed.

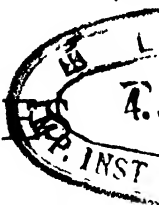
H. H. S.

MCDOWALL (Robert John Stewart) [D.Sc., M.B., F.R.C.P. (Edin.), Professor of Physiology, King's College, University of London, etc.] **The Science of Signs and Symptoms in Relation to Modern Diagnosis and Treatment. A Textbook for General Practitioners of Medicine.**—pp. viii+440. With 7 figs. 1931. London : William Heinemann (Medical Books) Ltd., 99, Great Russell Street, W.C.1. [21s.]

This book is reviewed in *Bulletin of Hygiene*, 1932, Vol. 7, p. 195.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.



Vol. 29.]

1932.

[No. 6.

HELMINTHIASIS.

BLACKIE (William K.). A Helminthological Survey of Southern Rhodesia.—No. 5 of the *Memoir Series of the London School of Hygiene & Tropical Medicine*. 1932. pp. vi+91. With 1 map and 3 figs. in text & 7 plates. [Numerous refs.] 1932. London: School of Hygiene & Tropical Medicine, Keppel Street, Gower Street, W.C.1. [10s. 6d. cloth; 8s. paper.]

This survey refers to human helminths only, except in so far as there was search in animals for worms already found in man. It extended from May, 1930, to February, 1931, and there comes to memory no similar work over a like period which has covered so wide a field with such completeness. And side by side with this must be put the fact that, accepting the conclusion (this *Bulletin*, Vol. 28, p. 227) that egg counts as a measure of the hookworm load of a community are a waste of time and money, Dr. Blackie has rejected their use and has so obtained leisure to concentrate on important matters; and by that very decision has reverted to an old and tried method of attack on helminthic infections. For faeces the usual microscopic technique was to examine the deposit obtained by the straining and centrifuging of a formalized saline suspension; and the macroscopic one straining of disintegrated stools on the lines advised by Maurice HALL. For urine, concentration was by precipitation, gravity precipitation followed by centrifugal. Blood examination took the usual lines.

These investigations indicated schistosomiasis as the most important helminthic infection in the area. With the exception of one district, *S. haematobium* and *S. mansoni* were both found in all parts examined, and the exceptional district was one which had to be traversed hurriedly and examined incompletely. Everywhere but in the Melsetter district *S. haematobium* greatly predominated with a relatively level general incidence, but in that district *S. mansoni* was slightly the more frequent. Gross clinical manifestations were very rare, and judged by egg numbers in 227 urines 130 infections were classed as very light, 50 as light and 47 as moderate. Yet 12 autopsies showed that clinical study gave an imperfect impression of the amount of tissue injury present; for although the parasites were few in numbers, the pathological changes were extensive and damaging, particularly in the liver in

infections with *S. mansoni*. It was shown that the common local intermediate host of *S. haematobium* was *Physopsis globosa*, while that of *S. mansoni* was *Planorbis pfeifferi*. Although no natural infections were found in animals, *S. mansoni* was reared in *Cercopithecus pygerythrus* and infectivity continued for six months. Foci of *Pl. pfeifferi* were fewer and less widely spread than those of *Ph. globosa*. Alternate seasonal drying and scouring of river-beds serve to keep molluscan numbers in check. Details are given of the means by which infected snails were packed and transmitted to London, with a loss of only 10 per cent. in 26 days. A third schistosome parasitizes man here, *S. mattheei* [this *Bulletin*, Vol. 28, p. 195]. It was found in 11·3 per cent. of 167 sheep, in 30·8 per cent. of 26 cattle, and in 10 men. In 8 of these the diagnosis was made on the long spindle-shaped eggs (210 to 240 by 40 to 70 μ); in two the adults were found in the veins after death, but since *S. haematobium* was also present the real pathogenicity could not be determined. The intermediate host was *Ph. globosa*; the baboon, *Papio porcarius*, was implicated as a "reservoir" host, but in it the fluke inhabited the intestinal veins and not the vesical ones as it does in man. Two *C. pygerythrus* were artificially infected, and in them, too, the habitat was the intestinal veins. *S. mattheei* is not, then, a negligible parasite of man in this locality, and with development of stock farming is likely to become important. The difficulties of eradicating the molluscan hosts of schistosomes are pointed out; and the importance of the early treatment of European school-children, with the diagnostic aid of Fairley's intradermal test, is stressed.

Hookworm infection stands next in importance, varying in the areas and communities sampled from 0 to 23·2 per cent. Since in the reviewer's egg-counting (a process essential for the evaluation of concentration techniques although useless as an accurate gauge of worm load) the number of eggs delivered by the type of technique used in this investigation averaged 37 per cent. of those proved to be actually present, he is convinced that the real figures must have been considerably higher, and is confirmed in that conclusion by Dr. Blackie's comment that Dr. R. H. MORRIS used D.C.F. locally and demonstrated infection in 45 per cent. of 214 examinations, and in 81 per cent. of 92 specimens from alien natives. It seems little realized that any ordinary medical centrifuge can readily be adapted for D.C.F. As so determined, infection was markedly patchy, adjacent kraals showing relatively low or strikingly high figures, while some kraals showed none. So far as worm counts at autopsy or after treatment are a trustworthy guide, the worm load was under 25 in 30 out of the 33 cases examined. Two mines were investigated. In a shallow coalmine the percentages of infection detected in European officials and in native miners were 0 and 17, whereas in a deep gold mine they were 50 and 37, and there was evidence of lessening native infection with lengthened work in the mines. Although the mine gallery dead-ends, often used for defaecation, were deemed favourable in moisture content for larval development, no extractions of their soil were successful in displaying larvae. The predominant species of hookworm was *Necator americanus*, and this is correlated with SVENSSON's observation that eggs of this parasite develop at higher temperatures than do those of *A. duodenale*. [Against this correlation the reviewer ventures to point out what HUXLEY called "a nasty little fact." At an altitude of 5,000 to 7,000 feet in Darjeeling, where hookworm infection is a major problem, it is almost, apparently quite, purely with *necator*; as one drops to lower and

warmer altitudes ancylostomes begin to appear ; moreover SVENSSON'S cultures were untrapped.] With regard to possible ill effects caused by light infections, Blackie preserves an open mind, and in effect suggests that the matter still lacks adequate investigation.

A striking survey of infection by *Ternidens deminutus* was carried through without knowledge of that by SANDGROUND (*ante*, p. 69). In some 1,200 examinations carried out in the south-east corner of the Colony, this infection was found in 5·3 to 32 per cent. of persons, none being Europeans. Worm counts were made after 3 cc. of carbon tetrachloride, and it is necessary to note the fact, elsewhere reported (*loc. cit.* p. 314) that with this dose there occurred in his hands one of the usual freakish killings characteristic of the drug. The number of worms recovered in each case was 3 or 4, with a maximum of 8. Dark material, presumably blood, filled the worms' gut. Successful cultures yielded, about the seventh or eighth day, infective filariform larvae, with no tendency to climb from cultures ; they were activated by heat and by agitation, but were "negatively thermotropic and negatively phototropic" and failed to penetrate human skin. They had a limited resistance to drying. The worms were present naturally in 3 of 5 *C. pygerythrus* and 22 of 29 *P. porcarius*, but experimental oral infections all failed.

Eggs of *Strongyloides fülleborni* and larvae of *S. stercoralis* were found, the former naturally parasitizing the monkeys and baboons already mentioned. *Ascaris* was present in 0·7 to 12·1 per cent. of various communities, trichuris in 0·5 per cent. of 758 examinations. Trichinosis was not detected in pigs. In 200 blood examinations *F. bancrofti* was found twice and *F. perstans* 7 times. Eggs with the characters of *Physaloptera caucasica* were repeatedly found in one man ; they, too, were present in baboons and monkeys. Oesophagostomes and trichostrongylus eggs were each found once. *Taenia* and *Hymenolepis nana* infections reached a maximum local percentage of 6·3, and *H. diminuta* and *Dipylidium caninum* were found parasitizing the same girl. On four occasions eggs which had been ingested in food were detected in the faeces. Those of *Hepaticola hepatica* were found in a boy who had had a meal of field rats,* those of *Heterodera radicolica* were seen twice and were once traced to potatoes. Finally eggs of *S. mattheei* appeared in a man who had enjoyed on the previous day a satisfying length of half-raw ox gut.

Such are main features of a survey which takes by right an honourable place in the Memoirs Series of the London School of Hygiene and Tropical Medicine.

Clayton Lane.

CABREZA (Juan) & TIRONA (Jose P.). **Incidence of Intestinal Parasitic Infection in 719 Filipino Beneficiaries.**—*Med. Bull. Veterans' Administration* formerly *U.S. Veterans' Bureau Med. Bull.* 1931. Nov. Vol. 7. No. 11. pp. 1060–1062.

These 719 men had enrolled for military service during the World War and had been discharged. 293 or 40·7 per cent. were found to the smear to carry intestinal parasites ; the numbers which harboured the different parasites (including, that is, multiple infections) were *Ascaris* 210, *Trichuris* 111, "*Ankylostoma duodenale*" 87, *Strongyloides* 12, *Taenia solium* 5, *Enterobius* 3 and *Dipylidium caninum* 1. C. L.

* A favourite food in parts of Central Africa.—Ed.

KHAW (O. K.). **A Survey of Pelping Latrines for Intestinal Parasites.**—*Nat. Med. Jl. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 622-643. With 6 figs (4 on 2 plates). [36 refs.]

Three samples of mixed faeces from each of 56 latrines were examined suspended in saline or stained with iodine-eosin. The percentages of latrines infected by the various parasites were cysts of *E. histolytica* 25, *E. coli* 82, *E. nana* 27, *I. bütschlii* 25, *Giardia intestinalis* 21, trichomonas trophozoites 12·5; ova of hookworms 32, ascaris 99, trichuris 16. *Taenia onchosphaera* were found in one and nematode larvae in two latrines. The incidence was greater in public than in private latrines. The prevalence of "unconscious coprophagia" is noted. C. L.

VIALATTE (Ch.). Recherches helminthologiques dans la garnison de Fès. [**Helminths in the Fez Garrison.**]—*Arch. Inst. Pasteur d'Algérie*. 1931. Sept. Vol. 9. No. 3. pp. 470-475.

The method of faecal examination used is Telemann's on a single occasion. The findings are shown in the table.

Race.	No. of Individuals examined.	Number of positive examinations					
		Ascaris.	<i>Necator americanus</i>	<i>Schistosoma Mansoni</i> .	<i>Strongyloides stercoralis</i> (larvae).	Taenias	Trichuris
Senegalese	143	3	104	6	2	10	31
Native North Africans	212	15	0	0	0	0	115
Europeans	146	0	0	0	0	1	32

It is believed that the hookworms are all necators partly because only these were found after an anthelmintic, partly because of the size of the eggs which average in this medium 70·6 μ by 44 μ . C. L.

PIROT (R.). Le parasitisme intestinal dans la région de Toulon. [**Intestinal Parasites at Toulon.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 78-85.

In 500 examinations by the Telemann-Langeron technique made on all classes of persons (Europeans) the percentage infections were: Trichuris 13·6, Ascaris 2·8, *Necator* 0·4, *Taenia saginata* 0·6, *H. nana* 0·2, thread worms 0·2, *Entamoeba dysenteriae* (vegetative) 2·2, cysts 6·4, cysts of *E. dispar* 1·6, of *E. nana* 0·4, of *P. bütschlii* 0·2, of *E. coli* 9·2, of *G. intestinalis* 3·8, *C. mesnili* (vegetative) 0·4, *T. intestinalis* 1·2, *Blastocystis hominis* 4·4, infusoria 0·2. C. L.

ZSCHUCKE (Johannes), SZIDAT (Lothar) & WIGAND (Rudolf). Ein Beitrag zur Kenntnis der Verbreitung menschlicher Helmintheninfektionen am Kurischen Haff. [**Distribution of Human Worm Infestations on the Kurisches Haff.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Feb. 25. Vol. 124. No. 1/2. pp. 1-16. With 3 text figs. [30 refs.]

The authors have examined the faeces of 523 [or 535] persons on the west and east shores of the Kurisches Haff [a lagoon in East Prussia,

adjoining the Baltic] by Telemann's method and by a simple water-diluted smear. The infection percentages were, by ascaris 24, trichuris 53, and diphylobothrium 34, while 29 showed no infection. In the village of Inse there was a 6.5 per cent. infection with *Opisthorchis felineus* in 213 examinations. Of double infections that with ascaris and trichuris was the commonest. Using Stoll's method of counting eggs it is computed that the average intensity of infection was by 12 ascaris, 6 trichuris, 3 to 4 diphylobothrium and 5 opisthorchis. Ascaris and trichuris infections were commonest in children but did not spare an old lady of 100. The immediate surroundings of houses were much fouled by small children. The delicacy of uncooked fish is responsible for predominant adult infections with the broad tapeworm and opisthorchis, though a child of 15 months did not escape. Enterobius, it is noted, is doubtless widespread though not displayed by the techniques used. The ascaris and tapeworm infections produced definite subjective and objective damage, which included backwardness at school, and the region constitutes a focus of heavy infection which calls for disinfection and change of habits of the community.

C. L.

JOYEUX (Ch.) & BAER (J. G.). Quelques faits relatifs à la pathogénie et à la thérapeutique des helminthiases. [**Pathogeny and Treatment of Helminthiasis.**]—*Marseille-Méd.* 1931. Oct. 25. Vol. 68. No. 30. pp. 493-500.

Certain general principles are re-stated. Damage done by worms is not proportional to the power of their organs of attachment. Those of any one species parasitize only certain allied host species. It is stated as a fact that SMILLIE and AUGUSTINE have shown in Alabama that infective hookworm larvae penetrate the skin of black races less readily than those of white. That parasitization by *T. saginata* is usually by one tapeworm is attributed to "prémunition" or resistance to further infection when infection has already occurred.

C. L.

FÜLLEBORN (Friedrich). Wanderung der Nematodenlarven in Körper des Wirtes. [**Migrations of Nematode Larvae within Host.**]—Reprinted from *Die Naturwissenschaften*. 1931. Vol. 19. No. 4. pp. 79-82. [Rets. in footnotes.]

A fine summary of knowledge on the matter. One point in the life of a great helminthologist must again be brought out. LOOSS discovered the cutaneous route of hookworm infection that is now the basis of all hookworm campaigns; through the millionaire Rockefeller Foundation those campaigns have brought relief to millions in the tropics; yet Looss enjoyed none of this golden fruit but died in 1923, completely destitute from inflation of the mark.

C. L.

HOEPLI (R.) & HSÜ (H. F.). **Histological Changes in the Digestive Tract of Vertebrates due to Parasitic Worms.**—*Nat. Med. Jl. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 557-566. With 4 figs. on 2 plates.

Except for one, a crow, the tissue changes reported on were all produced by parasites in cold blooded animals. They comprise superficial lesions of the mucosa caused by suckers, rostellum and buccal

armature acting mechanically ; changes such as dilatation mechanically produced in glands ; and deep lesions such as nodules, and ulcer or tunnel formation. In some of the cases of superficial lesions there was marked congestion of the vessels about the place of attachment, attributed to dislocation and strangling of the tissues [but in view of WELLS's observations (*infra* p. 421) the injection of a vasodilator by worms must be considered]. C. L.

BRUMPT (E.). Présentation de préparations microscopiques. [**Demonstration of Microscope Preparations.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 98–100.

The great numbers of parasites here reported are noteworthy. In a mouse infected by skin with larvae of *Strongyloides ratti* the number of these estimated to be present in the hepatized lungs was 4,240, while only 100 were found in the intestine. It is suggested that the larvae reported by FROES in pleural fluid [this *Bulletin*, Vol. 27, p. 468] probably came there from the lung.

In a mouse it is estimated that more than 6,000 cysticercoids of *Hymenolepis nana fraterna* were present in the first two-thirds of the small intestine, while the simultaneous presence of many adults is against the oft-quoted opinion of GRASSI that one infection immunizes against subsequent ones. C. L.

CASTELLANI (Aldo). **Endemic Funiculitis. A Brief General Account.**—*Jl. Trop. Med. & Hyg.* 1931. Nov. 16. Vol. 34. No. 22. pp. 373–376. With 2 text figs. [19 refs.]

Castellani in answer to requests redescribes this condition. Essentially it is a streptococcal, grafted on a filarial or bilharzial infection, beginning suddenly with swelling and pain in the region of the cord and grave toxic symptoms. The pampiniform veins are dilated, thrombosed or full of pus. Operation (excision or perhaps free multiple incisions) must be undertaken within 4 days if septicaemia is to be avoided. C. L.

READ (Bernard E.). **Treatment of Worm Diseases with Chinese Drugs from the Pen Ts'ao Kang Mu with Notes.**—*Nat. Med. Jl. China.* 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 644–654.

CHU (H. J.) & CH'ANG (I. H.). **Extracts from Some Old Chinese Medical Books on Worm Infections.**—*Ibid.* pp. 655–666.

These old-time treatments are perhaps of much the same type the world over. Four drachms of refined lead, or a teaspoonful of the comb of hornet's nest reduced to ashes, are queer things ; the juice of *Polygonum tinctorium* was advised for the "echo worm" which lives in the abdomen and answers back to the conversation ; peach leaves were prescribed for the 3 insects living in head, abdomen and feet respectively which on a certain day during sleep have the underhand habit of reporting the individual's behaviour to heaven ; infusion of the ash of one *old* wooden comb and one *old* bamboo toothcomb were held invaluable for symptoms caused by the greedy habit of chewing

lice. Then there is the long worm which comes out when food is smelt, the Ch'ih Ch'ung, which has a fleshy appearance and causes a murmuring in the intestine when it moves, another which reaches 40 to 50 feet in length. Piercing of the heart by a worm is fatal. [Still it is well to remember that Dr. John ARBUTHNOT, Queen Anne's famous physician, advised as "anthelmintick or contrary to worms" the swallowing of sharp fish bones with the intention of so annoying the worms that they forsook the intestine.] C. L.

LAMSON (P. D.), CALDWELL (E. L.), BROWN (H. W.) & WARD (C. B.).
A Comparison of the Anthelmintic Properties of Hexylresorcinol and Heptylresorcinol.—*Amer. Jl. Hyg.* 1932. Jan. Vol. 15. No. 1. pp. 306-314. [13 refs.]

Hexylresorcinol has been given in "several hundred thousand human cases as a urinary antiseptic with no untoward results." At least 70 to 80 per cent. is excreted in the faeces, the corresponding figure for heptylresorcinol being at least 96 per cent. The latter is very insoluble, the former is soluble in approximately one part in 2,000 in "saline." Both combine with protein and may cause a certain amount of rapidly-passing superficial irritation in the stomach. In fasting patients the percentage reduction of hookworm eggs after treatment, presumably as counted by the Caldwells' method, was as follows when reduced to the formula of formed faeces.

Dose.	No. of cases.	Egg Reduction Hexylresorcinol		
		Minimum.	Average.	Maximum.
1.0 gm. ...	25	16.6	62.7	97.7
0.8 gm. ...	11	26.5	68.9	90.1
0.6 gm. ...	22	0.0	63.6	100.0
0.4 gm. ...	4	23.1	63.9	93.9

Dose.	No. of cases.	Egg Reduction Heptylresorcinol.		
		Minimum.	Average.	Maximum.
1.0 gm. ...	17	23.8	55.2	85.0
0.8 gm. ...	13	0.0	42.5	91.6
0.6 gm. ...	10	6.7	51.2	95.4
0.4 gm. ...	—	—	—	—

In ascariasis heptylresorcinol in doses of 1 gm. caused an average percentage egg reduction of 73.5 in 17 cases and in doses of 0.6 gm., of 88.3 in 26 cases, in each series the reduction varying from 0 to 100. For trichuris the average percentage reduction in 15 cases was 35.8 for 1 gm., with variations between a gain of 6.5 and a loss of 71.7, while in 24 cases given 0.6 gm. the average reduction was 11.5, and on the recounts one had the same number of eggs as before, 14 had fewer and 9 had more. C. L.

ANGLADE, GAUDIN (O.) & ARCONY. Sur quelques résultats cliniques de l'utilisation des pyréthrines dans le parasitisme intestinal et ses troubles secondaires. [Clinical Results of Use of Pyrethrines in Intestinal Parasitism.]—*Bull. Acad. Méd.* 1931. Dec. 15. 95th Year. 3rd Ser. Vol. 106. No. 40. pp. 654-657.

In the main the paper deals with oxyuris of which parasite it is confidently said that faeces never contain the eggs, and that all remedies employed for its eradication are either dangerous or ineffective. The treatment is a coffee spoonful of certain granules containing 2 per mille of pure pyrethrines, which granules X-rays show to disintegrate so slowly that the process occupies the entire passage of the intestine. [The obvious misstatements and lack of care which mark this enthusiastic advocacy (see too this *Bulletin*, ante p. 39) should not prevent a cold scientific testing of the drug if the formula of the granules is disclosed.] C. L.

GAUDIN (O.) & CARRON B.). Action des pyréthrines sur la musculature des helminthes. [Action of Pyrethrines on Helminth Muscles.]—*Bull. Acad. Méd.* 1931. Oct. 20. Year 95. 3rd Ser. Vol. 106. No. 32. pp. 226-229. With 2 text figs.

In *Ascaris lumbricoides* of the pig and in the pig tapeworm *Macracanthorhynchus hirudinaceus* solution of pyrethrines paralyses the muscles, in the latter with a previous phase of stimulation. The strengths of solutions noted on two graphs are 1/5000 to 1/7,500. C. L.

LAMSON (Paul D.) & WARD (Charlotte P.). Anthelmintic Properties of Certain Alkyl Cresols.—*Proc. Soc. Experim. Biol. & Med.* 1931. Dec. Vol. 29. No. 3. pp. 340-341. [8 refs.] [Med. School, Vanderbilt Univ., Nashville, Tenn.]

"The introduction of the methyl group into phenol is well known to reduce its toxicity and it might be expected that these higher cresols would show a still less toxic action. Our experiments with 4-n-hexyl-m-cresol in rats and dogs confirm this view. . . . Because of certain properties of 4-n-hexyl-m-cresol, namely its being a liquid, and causing less local irritation than hexylresorcinol, further experiments in both animal and man are being carried out in order to determine its possible value as a human anthelmintic." C. L.

BAYLIS (H. A.). The Names of Some Molluscan Hosts of the Schistosomes — Parasitic in Man.—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 369-372.

"To sum up, while no attempt is made here to give a complete list of the vectors of the human Schistosomes, the following list of corrected names may serve to make clear the conclusions reached from the foregoing discussion.

Hosts of *Schistosoma haematobium*.

Bulinus truncatus (Audouin, 1826).

(Synonyms: *contortus*, *dybowskii*, *innesi*, etc.)

Physopsis africana Krauss, 1848.

Physopsis globosa (Morelet, 1866).

Planorbis (*Planorbis*) *dufourii* Graells, 1846.

Hosts of *S. mansoni*.

Planorbis (*Planorbula*) *boissyi* Potiez and Michaud, 1838.

Planorbis (*Planorbula*) *pfeifferi* Krauss, 1848.

Planorbis (*Planorbina*) *olivaceus* Spix, 1827.

Planorbis (*Planorbina*) *guadaloupensis* Sowerby, 1821.

Planorbis (*Planorbina*) *centimetralis* Lutz, 1918.

Planorbis (*Planorbina*) *antiguensis* Sowerby, in Reeve [1877?].

Physopsis africana Krauss, 1848.

Bulinus tropicus (Krauss, 1848).

Hosts of *S. japonicum*.

Oncomelania (Hyposobia) nosophora (Robson, 1915).

Oncomelania (Hyposobia) formosana (Pilsbry and Hirase, 1905).

Oncomelania (Hemibria) hupensis Gredler, 1881." C. L.

GORDON (R. M.). **The Molluscan Host of *S. haematobium* in Northern Nigeria.**—*Ann. Trop. Med. & Parasit.* 1932. Mar. 19. Vol. 26. No. 1. pp. 117–118. With 1 text fig.

Gordon demonstrated *Physopsis globosa* in numerous small ponds in Kano, Northern Nigeria. In them children bathe and fish, and a high proportion suffer from *S. haematobium* infection. BLACKLOCK (this *Bulletin*, Vol. 22, p. 463) showed that this snail acts as intermediate host to *S. haematobium* in Sierra Leone. C. L.

VOGEL (Hans). Beiträge zur Epidemiologie der Schistosomiasis in Liberia und Französisch-Guinea. [**Epidemiology of Schistosomiasis in Liberia and French Guinea.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Mar. Vol. 36. No. 3. pp. 108–135. With 12 text figs. [2 pages of refs.]

In the interior of Liberia *S. haematobium* is widespread and the cause of much genito-urinary illness, but the local intermediate host has remained undetected in spite of field and experimental work. In view of BLACKLOCK's work in Sierra Leone *Physopsis globosa* may well be implicated here and in French Guinea. Regarding *S. mansoni*, *Planorbis Pfeifferi* has a strong attraction for its miracidium, while cercariae from this snail have infected monkeys, which have passed lateral-spined eggs 40 days later, with recovery of adults from the veins. The cercariae of the three schistosomes common in man are held to have the same general structure, except that those of *S. mansoni* have 5 pairs of excretory cells, instead of 4, four pairs lying in the body and one in the tail. Since the intermediate hosts are held to be greatly restricted in numbers and distribution, the prospects of a campaign against them are good. C. L.

ZAVATTARI (Edoardo). Presenza della Schistosomiasi vescicale nel Fezzan. [**Urinary Schistosomiasis in Fezzan (Tripolitania).**]—Reprinted from *Boll. Soc. Med.-Chirurg. di Pavia*. 1932. Vol. 46. No. 1. 15 pp. [17 refs.]

The author in 1929 examined for schistosomiasis in Cyrenaica and found it endemic in the Derna district. He met with no intestinal cases; all were urinary. In the summer of 1931 he started a fresh investigation in Fezzan. Again he found *S. haematobium* only and examination for molluscs in several localities of Sciati, Hofra and Ghat resulted in the discovery of *Melania tuberculata* in abundance in most waters and *Bulinus contortus* less numerous and less frequently; no *Planorbis*. In spite of the presence of *Melania* he saw no cases of paragonimiasis. Recently Dr. RAGAZZI of Misurata informed the author that he had found *Planorbis metidjensis* which, however, is not, he states, an intermediate host of *S. mansoni*. He maintains that there is a chain of foci "from the Atlantic to the Nile across the whole of Northern Africa," and that there is need for a more complete survey to determine the distribution and prevalence of schistosomiasis in the colony. H. H. S.

MAKAR (Naguib). **Cystoscopic Appearances of Bilharziosis of the Bladder.**—*Jl. Egyptian Med. Assoc.* 1932. Feb. Vol. 15. No. 2. pp. 43-52. With 20 figs. (18 coloured) on 6 plates. [6 refs.]

This paper must be consulted in original. It is closely written and so cannot be satisfactorily abstracted, while the fine coloured plates of cystoscopic appearances are essential for its proper understanding. It deals with the cystoscopic appearances of bilharzial hyperaemia, tubercles and nodules; the end of these in calcification or a "membrane"; the separation of this with disclosure of ulceration; the bilharzial papilloma and carcinoma. An X-ray photo shows calcification of the wall of the bladder and ureter. C. L.

FAIRLEY (N. Hamilton). **Vesical Schistosomiasis complicated by Carcinoma.**—*Brit. Med. Jl.* 1931. Nov. 28. pp. 983-985. [3 refs.]

The duration of disease was about 30 years, the first symptoms appearing in South Africa. During the last 29 years he had not left England. The worms had, then, lived for that period and repeated reinfection had not preceded the superimposition of carcinoma on vesical schistosomiasis. At the first urine examination no ova were found, but the skin test and complement fixation with bilharzial antigen being markedly positive, subsequent examination was made and showed a few dead ova of *S. haematobium*. Death followed, with widely diffused carcinomatous nodules; the primary seat was at the base and neck of the bladder and contained many schistosome eggs, some with normal miracidia. It is pointed out how important is early diagnosis and treatment of schistosomiasis and how cystoscopy, complement fixation, and intradermal skin tests may reveal infection when ova cannot be found in urine or faeces. The nature of the case was not recognized till the patient came under the author's care. C. L.

GIRGES (Rameses). **The Prognosis of Schistosomiasis Haematobium.**—*Jl. Trop. Med. & Hyg.* 1931. Oct. 15. Vol. 34. No. 20. pp. 342-345.

Prognosis is considered in detail under the headings: general, presence of special symptoms, complicating conditions, and stage of the disease. C. L.

TOMB (J. Walker) & HELMY (M. M.). **The Diagnosis of Intestinal Schistosomiasis by Sedimentation.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 181-185.

Faeces are shaken up with 15 times their volume of 0.7 per cent. salt solution, the suspension sieved without stirring through gauze of 100 meshes to the linear inch, and allowed to stand in a urine glass from 15 to 20 minutes. For examination 0.5 cc. "of the contents of the urine glass" are examined covered by bits of ordinary slides. The smear method discovered 10 per cent. of 48,581 cases of *S. mansoni*, the sedimentation method 18 per cent. of 66,588 in the corresponding periods of consecutive years. By what is described as "the flotation method" ascaris infection was discovered in 42 per cent., and by this sedimentation method in 56 per cent. of 200 cases. [The flotation method selected must have been a poor one.] Heterophyes infection was discovered in 51 of 100 cases by smear and 72 of 100 by sedimentation. C. L.

KASTEIN (J.). Beobachtungen von gehäuftem Auftreten von "Schistosomum-japonicum"-Erkrankungen in Shanghai. [A Crop of *S. japonica* Infections in Shanghai.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Jan. Vol. 36. No. 1. pp. 1-4. With 1 text fig.

The recent Yangtse floods have induced a crop of acute schistosomiasis cases in and about Shanghai. They have followed the recognized course. Fuadin in doses rising to 5 cc. every other day has been successfully used in treatment. C. L.

MOHAMMED (Abdel Shafi). The Secretory Glands of the Cercariae of *S. haematobium* and *S. mansoni* from Egypt.—*Ann. Trop. Med. & Parasit.* 1932. Mar. 19. Vol. 26. No. 1. pp. 7-22. With 7 figs. [14 refs.]

Serial sections of many single cercariae have enabled the author to count in *S. haematobium* from *Bulinus contortus* and *B. dybowskii* up to five pairs of glands, two large oxyphilic and three small basophilic and in *S. mansoni* from *Planorbis boissyi* six pairs, two large oxyphilic and four small basophilic. C. L.

AZMY (Soliman). Pulmonary Arteriosclerosis of a Bilharzial Nature.—*Jl. Egyptian Med. Assoc.* 1932. Mar. Vol. 15. No. 3. pp. 87-90.

In two Egyptian peasants heavily infected with urinary and intestinal bilharzia there were found advanced peribronchial and perivascular bilharziomata with ova in the adventitia of the vessels and a generalized pulmonary endarteritis obliterans. The pulmonary artery was dilated and studded with raised rubbery patches suggestive of early syphilitic lesions but containing no bilharzia ova. The left side of the heart was normal and the Wassermann reaction negative. C. L.

KHALIL & HASSAN (Ali). The Serum Globulin in Human Schistosomiasis.—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 149-166. [14 refs.]

"The aldehyde test is positive in a small percentage of cases of human schistosomiasis.

"The majority of the sera which gave positive tests were from cases with enlarged spleen.

"It appears that the degree of the disease or the viability of the worms, as judged by the presence of viable ova in the excreta, has no bearing on the test. The test cannot be relied on as a method of diagnosis of schistosomiasis.

"The sera which give a positive aldehyde test appear to be associated with a high globulin content, the ratio of globulin to albumin is high, and the euglobulin is also greatly increased.

"A systematic quantitative study of the serum proteins in schistosomiasis has been carried out for the first time.

"In human schistosomiasis, the total serum proteins do not vary much from normal, but the globulin and the globulin-albumin ratio and the percentage of the euglobulin are increased.

"In Bilharzia patients with enlarged spleen, the total globulins, the globulin-albumin ratio and the euglobulin are still further increased. This increase is not as great as in established cases of kala-azar.

"Most of the sera from patients with enlarged spleen showed a high percentage of euglobulin without any relation to the presence or absence of *Schistosoma* infection.

"In all the cases here cited, there is no evidence of the presence of visceral leishmaniasis which is totally absent from Egypt. In view of this, the aldehyde test cannot be considered diagnostic of visceral leishmaniasis." C. L.

BRUMPT (E.). *Cercaria ocellata* déterminant la dermatite des nageurs, provient d'une bilharzie des canards. [Swimmer's Dermatitis caused by *C. ocellata* of Ducks.]—C. R. Acad. Sci. 1931. Oct. 12. Vol. 193. No. 15. pp. 612-614. With 12 text figs.*

Being convinced from epidemiological studies in the Bois de Boulogne that the adult form of *Cercaria ocellata* must inhabit ducks or swans, Brumpt placed four ducks in a tub containing *Planorbis corneus*, *Limnaea stagnalis* and *L. limosa*. When killed on thirteenth day they showed eggs of *Bilharziella polonica*, others resembling those of *B. yokogawi*, and boat-shaped eggs. Eight controls were negative. Three ducks were then infected with *C. ocellata* and on death all showed the boat-shaped eggs in the mucosa of the alimentary canal; while, in two, very delicate paired flukes were found in the superficial vessels of that mucosa. The fragments so recovered and tissue sections enabled Brumpt to identify them as *Trichobilharzia kossarewi* Skrjabine and Zakharow, 1920, whose valid name accordingly becomes *Trichobilharzia ocellata* (La Valette, 1854) Brumpt, 1931.* C. L.

LIBERT (C. E. M. J.). A Case of Paragonimiasis.—*West African Med. J.* Lagos. 1932. Jan. Vol. 5. No. 3. pp. 51-52.

A boy of 11 had coughed blood at intervals for 5 years. This began when at Mamfe and his travels included Bamenda, Bale and Bafut (Cameroons, British Sphere), and his diet cray fish from the Badi river. On 5 successive days the sputum contained operculated ova "40-70 μ in length" which had the appearance of those of paragonimus eggs. "A portion of the sputum has been forwarded to Professor LEIPER for his opinion as this is the first time a paragonimus infection has been reported in Nigeria. Treatment with emetine caused a clearing up of the symptoms and the boy now appears normal." C. L.

TOULLEC (F.) & RIOU (M.). Le tubage duodénal dans les distomatoses hépatiques à *Clonorchis sinensis*.—Essais thérapeutiques. [Duodenal Tubage in *C. sinensis* Infections.]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 147-149.

Continuing their investigations [*ante*, p. 46] these authors have found that, judged by the eggs recovered by duodenal sound, treatments by filicine, benzol up to 120 drops, tartar emetic intravenously, oil of chenopodium 75 drops, thymol 3 gm., and phenolphthaleine tetrionide, were all useless. [One cc. of chenopodium oil furnished DARLING and SMILLIE (this *Bulletin*, Vol. 19, p. 247) with 18 to 70 drops of the oil according to the pipette used]. C. L.

This summary is in substitution for that published in this *Bulletin*, *ante*, p. 48.

MONTGOMERIE (R. F.). **On the Longevity of *Fasciola hepatica* in Experimentally Infected Rabbits.**—*Jl. Helminthology*. 1931. Nov. Vol. 9. No. 4. pp. 209-212.

As falling in with, and so confirming, work on hookworms, periodic counts of faeces of two rabbits which had carried an experimental infection with *F. hepatica* for over a year suggested no gradual dying off of the flukes. C. L.

KATSUTA (I.). **Studies on Trematodes whose Second Intermediate Hosts are Fishes from the Brackish Waters of Formosa (III. Report). On a New Trematode "*Monorchotrema microrchla*" of which the Mullet is the Second Intermediate Host.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Feb. Vol. 31. No. 2 (322). [In Japanese. With 8 figs. English summary p. 16.]

"1. The encysted larvae are found in the scales, gills and fins of the mullet, but not in the muscles.

"2. The worm is very small, measuring 0.587 mm. in length by 0.233 mm. in breadth; the prepharynx is very short, the esophagus considerably longer, measuring 0.144 mm. in length.

"The ventral sucker is peculiar, as it is in *Monorchotrema taichui* and *Metagonimus yokogawai*, and is closely associated with the genital sucker; there are conspicuous radiating spines surrounding the ventral sucker, confined to the latter, wanting on the genital sucker; they number about 46-48, measuring 0.0096-0.0160 mm. in length by 0.0016-0.0032 mm. in breadth. The testis is single and smaller than in other species of *Monorchotrema*, measuring 0.091 mm. in length by 0.089 mm. in transverse diameter.

"3. The eggs of this worm resemble more or less closely those of *Metagonimus yokogawai* or *Heterophyes*, to which fact it will therefore be necessary to pay attention; their measurements are 0.0286 mm. in length and 0.0157 mm. in width; the posterior end forms a protuberance.

"4. Natural final hosts of this worm are dogs and cats; besides it can easily be established by experiment in man, but I did not succeed to infect the duck." C. L.

ESSEX (Hiram E.) & MAGATH (Thomas B.). **A Comparison of the Viability of Ova of the Broad Fish Tapeworm, *Diphyllobothrium latum*, from Man and Dogs: its Bearing on the Spread of Infestation with this Parasite.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 698-704.

With regard to the statement that evidence in the press showed that ova from man developed readily while those from dog did not [*ante*, p. 49], the evidence is now offered. An ovum was held non-viable if it failed to produce a motile coracidium or showed degenerative changes. Ova were separated from faeces by repeated washing and sedimentation. 4,000 eggs were in this way isolated from three men and 5,000 from 5 dogs, the isolations being made in exactly similar conditions and the diets of the two classes being comparable. Viable coracidia resulted from 79.05 per cent. of the eggs from man and 0.96 per cent. of those from the dog. A temperature of -10°C. for 48 hours killed all eggs. "Cultures of ova held at a temperature of +15°C. [59°F.] for eight months developed normally when again placed at room temperature." Drying was fatal, but age and number of worms and diet of host had no influence. Most dogs expelled their worms in 6 to 8 months; one harboured his for two years. Lack of fertilization is held sufficient to account for the facts in this case. C. L.

PLOTZ (Milton). *Diphyllobothrium latum* Infestation on the Eastern Seaboard : Twenty-One Cases from New York.—*Jl. Amer. Med. Assoc.* 1932. Jan. 23. Vol. 98. No. 4. pp. 312-314.

" 1. Twenty-one cases of infestation with *Diphyllobothrium latum* are reported from New York City. These are the first cases reported in the literature from New York State and include five patients born in the United States, bringing the total number of reported native cases to thirty-one.

" 2. All but two of the patients were females and all but two Jewish.

" 3. Mild to severe anemia was found in all of fifteen cases in which blood studies were made. One is not justified in concluding from this series that there is a definite relationship between primary anemia and this disease. Eosinophilia was found in five of eleven cases in which differential counts were made."

C. L.

MAPLESTONE (P. A.) & MUKERJI (A. K.). Carbon Tetrachloride in the Treatment of Taenia Infections.—*Indian Med. Gaz.* 1931. Dec. Vol. 66. No. 12. pp. 667-670.

The dose of carbon tetrachloride was 3 cc. The results are given in the Table :—

Results of treatment with male fern and carbon tetrachloride.

	Male fern.	Carbon tetra- chloride.
Number of cases	34	25
Number from which scolices were recovered	5	8
Number traced and found cured	0	10
Number not traced	21	3
Number not cured	8	4

" Our cure rate at its lowest estimate is 72 per cent. and that of Daubney and Carman varies between 69.5 per cent. and 97 per cent. for different series of cases, so there seems little doubt that carbon tetrachloride is a better drug than male fern for the removal of tapeworms. Another point is that as we have succeeded in curing at least the same percentage of cases with carbon tetrachloride by the mouth as Schneider has cured with male fern by the duodenal tube ; our form of treatment is preferable because it is much simpler and less irksome to the patient." [See this *Bulletin*, Vol. 27, p. 954.]

Tetrachlorethylene was tried on 3 cases of *T. saginata* infection without effect.

C. L.

CARMAN (John A.). A Note on the Clinical Aspect of the Treatment of Taeniasis with Carbon Tetrachloride.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 187-190.

The author's paper deals with between 2,500 and 3,000 doses in persons who eat meat inordinately and often raw ; he summarizes it as follows :—

" 1. Taeniasis is the cause of more morbidity than is usually admitted and cases of death from this cause are seen from time to time.

" 2. A mixture of carbon tetrachloride and oil of chenopodium in the proportion of 3 to 1 is a safe and efficient anthelmintic against *T. saginata*.

" 3. Certain simple precautions must be rigidly adhered to if the treatment is to be used in out-patient practice."

[The dosage used for an adult was 4 cc. of carbon tetrachloride and 1.3 cc. of oil of chenopodium of unstated ascaridole content. The minimum lethal dose of carbon tetrachloride is 1.5 cc. (See M. STRAUB, *Geneesk. Tijdschr. v. Nederl.-Indië*, 1925, Vol. 65, pp. 624-645, and this *Bulletin*, Vol. 23, p. 479.) He reported three deaths in men who had 1.5, 2 and 2 cc. respectively. The cases are detailed on pp. 633 to 637 and the dosage of all clearly stated in a table on p. 639.]

C. L.

SCHMELEWA (A. A.). Anwendung der Duodenalsonde bei Austreibung von Bandwürmern. [**Use of Duodenal Sound in Treatment for Tapeworm.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 3. pp. 297-303. [43 refs.] [In Russian. German summary p. 303.]

The drugs administered by the duodenal sound are stated as :—

Extr. filicis maris aether.	4 gm.
Inf. sennae compos.	30 gm.
Gum. Arabici	3 gm.
Quinine	0.5 gm.

and half to one later hour the same quantity of senna and 10 to 15 gm. of sulphate of magnesia or soda. The tapeworms were passed in 13 minutes to 2 hours ; in 18 of the 22 cases the heads were found ; the species were *D. latum* 2, *T. solium* 2, *T. saginata* 18.

C. L.

MILLER (Harry M.), Jr. Superinfection of Cats with *Taenia taeniaeformis*.—*Jl. Preventive Med.* 1932. Jan. Vol. 6. No. 1. pp. 17-29. With 2 text figs.

— & MASSIE (Edward). Persistence of Acquired Immunity to *Cysticercus fasciolaris* after Removal of the Worms.—*Ibid.* pp. 31-36.

——. Further Studies on Immunity to a Metazoan Parasite, *Cysticercus fasciolaris*.—*Ibid.* pp. 37-46.

So far as the adult stage goes, the presence of the strobile in cats does not prevent their obtaining an added infection [it is in this sense that superinfection is here used] of this parasite when fed with the cysticercus. But pedigree white rats do obtain an immunity to further infection with the cysticercus even when the original cysticerci are removed, after laparotomy and appropriate incision of the liver, an immunity lasting for at least 60 days. Moreover, immunity to the development of onchospheres into cysticerci can be produced by intraperitoneal injection of fresh strobile into the rat or of powdered lipid-free extract of the dried strobile, or of living cysticerci ; but powdered *T. pisiformis* was inactive nor did powdered *T. taeniaeformis*, injected after rats had been infected with onchospheres, inhibit cyst development. [It is believed that the above expresses the intention of the author's summary.]

C. L.

BAYLIS (H. A.). **On a *Coenurus* from Man.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Jan. 30. Vol. 25. No. 4. pp. 275–280. With 3 text figs.

Baylis has examined part of a coenurus removed from man [*ante*, p. 54]. He deals with number, size and shape of hooks. In form the larger hooks seem to be closer to those of *T. multiceps*, the smaller to those of *T. serialis*. He finds, however, greater variation of shape in hooks of the same species but of different degree of development than between hooks of different species, and questions whether these two species can be separated at all by larval morphology; and he refuses to burden literature with a new name which may be merely a synonym.
C. L.

MORQUIO (L.). L'hémiplégie du kyste hydatique cérébral chez l'enfant. [**Hemiplegia from Cerebral Hydatid Cyst.**]—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1932. Jan. Vol. 3. No. 1. pp. 39–58. With 8 text figs.

Five cases of cerebral hydatid are described with radiograms showing opening of the cranial sutures; in one case there was also a cyst in each lung. Four of the cases were operated on with two cures and two deaths.
C. L.

CORT (W. W.) & STOLL (N. R.). **Studies on *Ascaris lumbricoides* and *Trichuris trichiura* in China.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 655–689. With 1 graph. [41 refs.]

In 5 Chinese districts about 4,000 faecal examinations were made by a Stoll egg counting method for ascaris and trichuris infections. The average infection by ascaris was so great in adults in some groups that it is concluded that these must be as susceptible as are children. In most groups the heavy soil pollution near houses must be a factor in causing a general incidence of over 80 per cent. The highest infections with both parasites were found in the Canton delta which produced what is claimed as a record, 1,001,200 ascaris eggs per gram of faeces. "Unfortunately we do not have information from Kwang Yik Wai which makes it possible to suggest what combination of conditions was present to build up such an infestation." Again, "In this region the trichuris infestation was especially heavy as compared with the other groups, which emphasizes the especial need of an abundance of moisture for the building up of heavy infestations with this parasite. On the other hand there was a very high incidence of trichuris in the group from northern Shantung with a low rainfall and a long cold winter."

"It was of interest to find one group in the Yangtze delta with a comparatively low infestation with both parasites associated with a good economic status and habits of cleanliness much better than the average for rural China. This shows that human infection with these parasites can be much restricted even where their eggs are spread widely by the use of human feces as fertiliser. On the whole this study emphasizes the fact that the combination of soil pollution by young children with the use of human excrement as fertilizer produces conditions very favourable for the spread of ascaris and trichuris especially in the adults. Unexplained differences in the intensity and distribution of these two parasites in the same population groups suggest differences in their etiology beyond those already understood."
C. L.

KELLER (A. E.). *Ascaris lumbricoides*: Loss of Infestation without Treatment.—*Jl. Amer. Med. Assoc.* 1931. Oct. 31. Vol. 97. No. 18. pp. 1299–1300.

The author's conclusions, based on egg counts, are :—

"The results obtained from this study show that under environmental conditions which are not suitable for the transmission of intestinal parasites the worm burden of infested individuals is markedly reduced without the use of anthelmintics. In this group of patients who did not receive treatment over a period of fifteen months a reduction in incidence of 100 per cent. occurred in the cases of *Ascaris*, 83·4 per cent. in the cases of *Hymenolepis nana*, 75·6 per cent. in the cases of *Trichuris* and 59 per cent. in the cases of hookworm infestation. This study shows that proper methods of disposal of human feces are more effective in the control of the common human intestinal parasites than the use of anthelmintics alone."

C. L.

MORTON (Charles Bruce) & ARCHER (Vincent W.). *Ascariasis*: Some Surgical and Roentgenologic Aspects.—*Jl. Amer. Med. Assoc.* 1932. Feb. 6. Vol. 98. No. 6. pp. 473–475.

"The histories of 110 patients with ascariasis were studied [in the University of Virginia Hospital] and in 41 individuals surgical consideration had been warranted. In five of them symptoms of cholecystitis had been simulated, and in twenty-four appendicitis or intestinal obstruction had been suspected. Eight patients had undergone operation, and in all instances ascarids were apparently responsible for the symptoms.

"It was suggested that ascariasis be considered in the differential diagnosis of atypical abdominal symptoms. A simple technic for the roentgenologic depiction of ascarids in the gastro-intestinal tract was described briefly. It was recommended for use in addition to the usual examination of the stools."

It consists in a barium meal after a night's fast with X-ray exposures 1, 2 and 4 hours later [this *Bulletin*, Vol. 28, p. 688.]

C. L.

MAPLESTONE (P. A.) & MUKERJI (A. K.). *The Treatment of Ascariasis.*—*Indian Med. Gaz.* 1931. Nov. Vol. 66. No. 11. pp. 627–629.

Using for the adult Indian santonin, calomel and sodium bicarbonate in doses of 5 grains [0·3 gm.] each, CHOPRA and CHANDLER (this *Bulletin*, Vol. 22, p. 672) claimed cures in 92 per cent. of 25 cases examined ten days later by the Kofoed and Barber technique. Mapleston and Mukerji using precisely the same treatment but checking it by D.C.F. obtained cures in 42·85 per cent. of 28 outpatients and 4 of 9 inpatients. With Russian santonin the corresponding cures were 20·5 per cent. of 44 and 6 of 9. With oil of chenopodium of unstated ascaridole content in 3 doses of 10 minims (0·6 cc.) each at hourly intervals, with magnesium sulphate two hours after the last, there were cures to D.C.F. of 56·5 per cent. of 23 outpatients and 54·5 per cent. of 44 inpatients. With 0·3 gm. of santonin in powder and 1 cc. of oil of chenopodium in capsule swallowed together followed by the saline, 23 outpatients had 56·5 per cent. of cures and 34 inpatients 82·3. The inpatients had a light diet the day before; there is no saying whether outpatients obeyed instructions as to diet. Age probably had an effect in modifying efficiency since, massing all treatment together, there were cures in 60 per cent. of adults and 48·2 per cent. of children, the figures for the combined chenopodium and santonin treatments being 92·3 and 54·8 respectively.

C. L.

- v. UNRUH (V.). Askariasis im subtropischen Mexiko. [**Ascariasis in Subtropical Mexico.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Jan. Vol. 36. No. 1. pp. 4-9.

The treatment was by capsules each containing 0.3 gm. of ascaridole. A hundred cases are reported. Illustrative cases show that the dose at 2½ and 4½ years was 1 capsule, at 11 years 2 capsules, at 16 and 19 years three capsules. The dose then for an adult was 0.9 gm. or as is alternatively stated 30 drops, and this is described as completely non-toxic. [It is a misfortune that drops should still be mentioned as a measurement. DARLING and SMILLIE pointed out in 1921 that various pipettes delivered from 18 to 70 drops of the whole oil for 1 cc.] C. L.

- STILES (Charles Wardell). **Hookworm Disease in Certain Parts of the South : a New Plan of Attack.**—*Southern Med. J.* 1932. Feb. Vol. 25. No. 2. pp. 189-192.

Having been retired for physical disability after 40 years service, Stiles has reverted to a favourite subject—hookworm disease, and reports his experience of a 6,700 mile tour through the Southern States with which he has kept in touch since 1901. In that period the advance in public health has been enormous, with accompanying widespread belief that hookworm disease in man has almost disappeared. With this Stiles is in disagreement, and by way of demonstration cites two schools in which the results of a quick symptomatic inspection were compared with those of microscopic examination by unstated and possibly by varying techniques :—

Percentage infected as judged by					
			Symptomatic estimate.		Microscopic Examination.
			Uncorrected.	Corrected.	
School 14	...	...	96	77	97
School 15a	...	...	99	79	90

He emphasized the role of hookworm infection in producing backwardness in children and gives, among others equally striking, this example :—

" In a certain school (No. 71 of our series), after I had indicated the hookworm cases in five of the rooms, the principal exclaimed :

" ' Doctor, those children whom you have selected are our mentally backward children ! If hookworms cause backwardness, I want you to put the view to a test in connection with the sections of the eighth grade.' "

" I did so, with the result that in the highest section (described by the principal as her ' prize ' room) approximately 11 per cent. was selected as hookworm cases and suspects ; in the next section approximately 38 per cent., and in the lowest section 75 per cent. "

The new plan of control advised is that teachers should select all children who are mentally backward or in poor physical condition, all girls maturing slowly or with irregular menses, and all children who have had ground itch within a year ; should send their faeces for microscopic examination ; and should report positives to the parents and advise that the children should be treated. While no treatment is

advocated without a positive microscopic examination, it is suggested that this procedure will expose the mass of hookworm cases. Stiles ends :

" The fundamental problem in hookworm control is not a question of bookkeeping or microscopic examinations, but requires a change in the daily habits of hundreds of thousands of rural whites, Indians, and negroes. The solution of this problem will take at least three generations more of combined educational effort on the part of the schools, the health officers, and the physicians."

C. L.

SCHAPIRO (Louis) & NAUCK (Ernst G.). **Observations on Hookworm Disease in Costa Rica based on Postmortem Findings.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 705-714.

An important paper in view of the teaching in certain quarters that the gravity of hookworm infections can be indicated by the load of worms carried at a particular time. The report is based on 400 post-mortem examinations on hospital patients, all made within 24 hours of death. Hookworms were found in 133 cadavera and 24 persons died of hookworm disease, that is 18 per cent. of infected persons. In 79 of these infected persons data sufficient for the authors' purpose were collected. They yielded a total of 7,693 hookworms or an average load of 97.3, the care taken to insure complete collection being great ; in the 24 cases which died from infection the average worm load was 257, in the 55 who died from other causes it was 26. The percentage of hookworm species recovered from these 79 cases was *necator* 16.4, *ancylostomes* 15.2, both 68.4, the total numbers being *A. duodenale* 3,638 and *N. americanus* 4,055. Ovum counts from the bowel contents compared with worm counts gave more than twice the number of eggs expected by the Stoll factors, while the first two figures in a table of 10 examinations showed actual counts of 197,000 and 3,000 eggs against 76,400 and 17,350 had the postulated worm-egg ratios held. It is not known whether or not these people had been treated, though " it is to be inferred that a great many of them received hookworm treatment while in the hospital "; but

" In all cases in which more than 500 to 600 parasites were found at autopsy, symptoms of severe anemia with characteristic circulatory disturbances were present, especially the very typical edema of the skin and of almost all the body tissues. These cases also showed transudation into the serous cavities (which only rarely led to the accumulation of very large amounts of fluid); fatty degeneration of the heart musculature and of the liver and kidneys was frequently extensive. Pigment storage, especially the accumulation of iron-containing pigment in the liver, which is regarded by some authors as evidence of the destruction of the blood induced by toxins, was, on the other hand, almost entirely lacking. The spleen was unaltered in uncomplicated cases; occasionally it was small, with simultaneous atrophy of the Malpighian bodies and decrease of lymphatic tissue. Swelling of the lymph glands, in particular those of the retroperitoneum could be determined in a certain percentage of the cases. In the cases of marked anemia, the bone marrow always showed changes, indicating regenerative processes."

" The mucus found on the surface of the mucosa (which is frequently very sticky and abundant) may be very markedly stained with blood."

C. L.

VAN SLYPE (W.). Sur la fréquence de l'ankylostomiase. Considérations thérapeutiques. [*Ankylostomiasis and its Treatment.*]—*Bull. Méd. du Katanga*. 1931. Vol. 8. No. 5. pp. 143-146.

By an unstated floatation method—and they vary markedly in accuracy—72 routine examinations were made in a hospital. Hookworm eggs were found twenty-four times, taenia and schistosome eggs each twice, and strongyloides, ascaris, trichuris, giardia, trichomonas, and *Entamoeba histolytica* each once. Eleven of the hookworm cases were treated, normally with thymol 4 gm. (60 grs.) packed in capsules, with pretreatment and posttreatment purges. One died; an old rather undernourished man with chronic bronchitis given after hesitation 3 gm; four hours after taking the posttreatment purge of sulphate of magnesia, he developed pulmonary congestion with intense dyspnoea, blood-stained frothy expectoration and dullness over the right lung and died rapidly. It is noted that the symptoms are unique. Following treatment in the other cases, after a preliminary increase in egg numbers, these disappeared, sometimes to return, there being however no suggestion in the paper that this is a condition whose occurrence was established many years since. Ten persons were treated with 3 cc. of pure carbon tetrachloride without ill effect and with cure. Van Slype says that the thymol death was perhaps a coincidence. [Of the few reported deaths after thymol in the three million odd administrations, only two have had the same symptoms—two brothers who died collapsed and comatose with bloodstained vomit. In the attribution of symptoms to a single cause it is usual in medicine to expect that they shall have at least some slight measure of agreement.] C. L.

HUSSAMEDDIN. Sur l'ankylostomiase répandue dans le département de Rizé en Turquie et sur la lutte entreprise contre cette maladie. [*Ankylostomiasis in Department of Rizé, Turkey.*]—*Bull. Office Internat. d'Hyg. Publique*. 1931. Oct. Vol. 23. No. 10. pp. 1824-1828.

Investigations in Turkish laboratories have indicated Rizé at the south-east angle of the Black Sea as the spot in Turkey most heavily infected with hookworms. The coastal valleys are very fertile, growing crops and vines, and have a large rainfall. An inquiry by ZIYA Bey consisted in microscopic examination of stools of 5,989 persons, evidently by smear since it is stated that 3 or 4 examinations are necessary before infection can be determined. This being impracticable and concentrative methods evidently not considered, the routine was to administer an anthelmintic to all persons when the infection rate of a village approached 50 per cent. The average, as so determined, was 51.6 per cent., with variations from 41 to 75, but with no difference produced by age or sex. *Necator americanus* was the only hookworm found. Anthelmintic treatment was given to 5,001 persons. A single treatment, seemingly irrespective of kind or dose, reduced observed infection to 8.6 per cent. and a second to 1 per cent. At first this consisted of oil of chenopodium and carbon tetrachloride in unstated dosage, but owing to observed toxicity the former was omitted. Carbon tetrachloride (great stress is laid on the need for purity) in single adult dosage of 2 cc. gave to 20 per cent. of 1,200 persons violent headache and collapse, symptoms lasting for 6 to 12 or even 48 hours, while a rather high percentage suffered from vertigo and dizziness without headache. A child

of 8 (who according to the dosage for age given in the paper must have received between 0.8 and 1.6 cc.) was seized with very violent abdominal pain and vomiting next day, and died 3 days later; it is unstated, presumably it is unknown, whether or not she had ascaris infection. To 500 persons the drug was given in two doses followed in two hours by sulphate of magnesia; 5 per cent. had marked headache and faintness, another 5 per cent. had the same symptoms with a rise in temperature to 37.5°C. Accordingly the dose was reduced to 1.5 cc. in two portions with slight vertigo in 2 to 3 per cent. of cases. The local appearance of symptoms of hookworm infection dates only from the war and it is believed that the place became infected during the Russian invasion. Latrines are defective and insufficient. Some new ones have been constructed and advice has been given as to sanitation.

C. L.

WELLS (Herbert S.). **Observations on the Blood Sucking Activities of the Hookworm, *Ancylostoma caninum*.**—*Jl. Parasitology*. 1931. June. Vol. 17. No. 4. pp. 167–182. With 1 text fig.

After noting the controversy as to whether hookworms are blood-suckers, Wells shows by direct observation that *Ancylostoma caninum* is. By an ingenious clamp, an opened loop of dog's intestine was so arranged outside the body that hookworms engaged on their normal avocations could be observed directly by a low-power microscope while bathed in normal saline. Worms placed on the intestinal mucosa may move about for hours without attaching themselves, or through the purchase of their tails may push their heads down between the villi and have evidently considerable work to do before getting a firm attachment near the bases of these. Should they become attached near the tip of a villus they are restless till they get a deeper hold, but in the meantime the observer has a clear view of the process and effects of feeding. The vessels of the villus itself fill with blood, which in view of the site of attachment can hardly be due to strangulation. A red disc appears on that part of its surface which is enclosed in the oral aperture. The oral cavity fills with blood. The effect is produced by oesophageal suction, its lumen is widened, evidently by contraction of its roughly radial muscles, while ordinarily the closure of the oesophageo-intestinal valves enables the vacuum to be held and fills the lumen at first with plasma and cells and later with blood. With relaxation of the oesophagus the lumen first closes beside the oral capsule while the narrowing of the rest forces the contained blood into the intestine. When this fills, the forcible contraction [presumably of muscles which Looss showed to lie at posterior end] forces a sudden droplet of blood through the anus, and this occurs from the male even when it is in copula. Oesophageal contractions have not uncommonly a rhythm of 120 to 250 per minute. By enclosing the posterior end of a female worm in a pipette containing normal saline, by counting the red corpuscles passed in a given time, and by comparing these numbers with those in the dog's blood, it is calculated that each worm robs the host of 0.84 cc. of blood daily. This passes slowly along the gut, its haemoglobin becomes reduced as it nears the anus; so that hookworms can obtain oxygen through the intestinal lining. When a worm is placed in red blood, the haemoglobin near it gradually becomes reduced, presumably by absorption of oxygen through the cuticle. A copious supply of blood is

necessary for active vital processes. A worm detached for some hours is very sluggish, but if strong enough to reattach and obtain some blood, rapidly became fully vigorous; oviposition usually ceased on detachment of a worm, but was resumed in the one instance followed up as soon as feeding was effectively resumed.

Wells hesitates to conclude that this loss of blood is the cause of anaemia by reason of "the almost unanimous opinion of those who have done the most work with such patients that, since the stools of persons suffering from hookworm disease even in its most severe form are not highly coloured they cannot contain much blood," but he notes that since there is no method by which the amount of faecal blood can be estimated this appears to be assumption only. [Its presence in the faeces in ankylostome infection even with less than 20 worms was reported by Duncan WHYTE, this *Bulletin*, Vol. 8, p. 196.] C. L.

CALDWELL (Fred C.) & CALDWELL (Elfreda L.). **The Rate of Loss of Hookworms in the Absence of Reinfestation.**—*Jl. Parasitology*. 1931. June. Vol. 17. No. 4. pp. 209-222. With 1 text fig.

Three groups were studied. First one of Cherokee Indian scholars at a boarding school whose hygienic state was such as to make unreasonable any suggestion of infection during term, though the boys were not above playing pranks with the specimens they submitted. Second a rural community on a sandy Alabama soil. Third an individual, an accidental laboratory infection studied at intervals during 4 years in conditions making further infection unreasonable. Those found positive to "the salt flotation method" had mixtures of the stools passed on 3 consecutive days egg-counted by the Caldwell's own method at about monthly intervals. The average counts of the Indian group were unvarying from September to May; those of the Alabama group were the same in April as they had been in the previous October-November, with however an intermediate rise; those of the individual showed no notable variation in 4 years. Regarding age influence, in children in the rural group who were under 8, the average counts increased during the period of observation while in those over 13 they decreased. [See also CHANDLER, this *Bulletin*, Vol. 23, p. 773; Vol. 26, p. 991; CORT, Vol. 27, p. 440; PAYNE & PAYNE, Vol. 29, p. 64.]

C. L.

VAN THIEL (P. H.) & WOLFF (A. E.). **A Comparison of the Chemical Methods used to separate Larvae of the Hookworm of Man and Animals from the Larvae of Free Living Nematodes.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 726-732.

For distinguishing infective hookworm larvae from those of free-living nematodes, the authors compare the effects on them of BAERMANN's method, which adds one part of 7.5 per cent. caustic potash to five of water, with that of CORI, which adds one part of trade formaldehyde (40 per cent.) to 5 to 25 parts of water. If the worker can stand the formalin, that is advised for use, but it is significantly added, "We cannot dispense with the morphological examination of the larvae when using either of these methods," which aim at killing free-living nematodes while sheathed infective hookworm larvae escape. C. L.

LANE (Clayton). **Extra-Corporeal Development of Hookworms.**—*Lancet*. 1932. Apr. 2. pp. 741–745. With 2 text figs. [11 refs.]

“Investigation of 547 earth cultures has shown emphatically that emigration of infective hookworm larvae from them is frequent and may be very great, and accordingly that the many conclusions regarding larval biology, including longevity, conclusions which are mainly based on untrapped cultures, rest on so precarious a basis that they certainly are far from exact; that properly constituted larval traps have a high efficiency, and that any failure presumably lies in the make-up of the individual trap; that there is a method of extracting larvae, economical of space and allowing of this being done under exact conditions of temperature, which is not less efficient than that in general use; that to submit material to larval extraction for a few hours does not accurately measure its possible, perhaps not its momentary, infectivity; that the effects of texture of subsoil on the local prevalence of hookworm infection is reasonably explicable if hookworm larvae migrate through soil and subsoil in all directions, and are without that negative geotaxis which is commonly postulated—it is believed incorrectly, and certainly not merely without adequate evidence, but against some that exists; that if it is as safe as it seems to generalise on over 50 cultures of a mixture of four parts of earth and one of faeces, conducted with close checking of the water content, larvae develop best when this is as low as 25 per cent.; that even when in these conditions it falls as low as 9 per cent., and the culture is powdery, more than half the eggs may have developed into infective larvae, and that these may be so vigorous as to constitute of such infected soil a spot of intense infectivity; that these dry conditions need not lessen the infectivity of an infected spot, though they may annul migration of larvae from it; and that since infection in backward races is mainly defectional, obtained during defaecation, drought need in no way lessen the infectivity of those spots which are favoured by and returned to by such people day after day for this purpose, especially if they wash the parts on the spot. There is then no present justification for assuming that in certain regions and at certain seasons the possibility of acquiring infection must be disregarded. It is wiser to find out and not to guess.” C. L.

EARLE (Walter C.) & DOERING (Carl R.). **An Evaluation of Egg-Count Data in Hookworm Infestation.**—*Amer. J. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 513–556. With 6 text figs. [22 refs.]

“1. The frequency distribution of worm and egg counts is such that the logarithms of these counts more nearly approach the normal distribution and therefore give better results where statistical formulae assume normality of distribution.

“2. There is a constantly high correlation between logarithms of egg counts based on the examination of one stool and logarithms of number of female or total worms recovered after administration of an anthelmintic. Average of two or three counts—adjusting to “basis formed stools”—or using eggs per day, does not appreciably change the correlation coefficient.

“3. The fact that eggs are concentrated in small stools is confirmed here, but the usual classification of stool as formed and unformed is not a sufficiently good indication of stool size to justify its use.

“4. The decrease in egg production per female as the worm density increases would seem to be a rather common phenomenon in this group of worms. It is sufficiently marked to make it impossible to obtain one factor for estimating the number of worms from egg counts, which will apply over the entire range of worm densities.

“5. The greater egg production of *Ancylostoma duodenale* is confirmed, although the exact relation between the egg production of the two worms needs further controlled study.

" 6. In reporting results of hookworm surveys the per cent. of persons with eggs in the stool shows the proportion of the population infected, and the average logarithms of egg counts in those infected, with its standard deviation, shows the degree of infection in this group.

" 7. There are certain large differences in estimating eggs per gram per female worm in different experiments, which cannot be explained at the present time. Where it is necessary to know the number of worms one must determine the relation between egg and worm counts under the conditions prevailing at the time. For most cases, however, it is not necessary to know the number of worms; studies can be made using egg counts only.

" 8. Opinions concerning injury caused by hookworm infestations will continue to vary greatly until more accurate measures are available for determining the degree of the infestation and of the resulting injury. It seems, however, that some individuals show depression of hemoglobin with fairly light infestations.

" 9. The type of control work indicated is best decided by the local health officer, who is in a position to determine the relative importance of his public health problems."

[The list of references is limited to material published in the United States. The Old World does not deserve this neglect. It has in fact considered the matter and has anticipated the most important of these conclusions by nearly two years, and that without the use of logarithms (this *Bulletin*, Vol. 28, p. 227.).] C. L.

STUMBERG (John E.). **Cutaneous Retention of Infective Larvae of the Dog Hookworm, *Ancylostoma caninum*, and the Inflammatory Reaction to Skin Penetration.**—*Amer. Jl. Hyg.* 1932. Jan. Vol. 15. No. 1. pp. 186-205. With 2 plates. [18 refs.]

" Repeated skin infections on the same area of skin of white mice had no demonstrable effect upon the number of larvae which could be isolated (by Baermann apparatus) from that area of skin twenty-four hours after the last infection. The same experiment repeated on dogs gave varying results. The conclusion is drawn that a local acquired immunity due to repeated skin infection has not been demonstrated. There seems to be some evidence that subcutaneous injections of extract of larvae caused a retention of larvae in the skin during penetration, but this is not definitely established. It is doubtful whether local passive immunization by subcutaneous injection of antihookworm sera had any effect on the retention of larvae, though some of the results considered by themselves might indicate such an effect. Two control animals given a skin infection without previous treatment showed results which indicated that the variability of the method itself was at fault. Histological study of the areas of skin showed that there was no relation between experimental procedure and degree of reaction. The finding of larvae in serial sections was also independent of the number recovered by isolation. Attempted immunization had no effect on the fate of intradermally injected dead larvae. Areas of skin previously infected were characterized by an intense proliferation of fibrocytes in the dermis, especially the *stratum papillare*; the degree of reaction here seemed related to the number of previous infections. In one animal there was noted a phenomenon, the presence of mitoses in endothelial and adventitial cells of vessels in the hypodermis, which was unrelated to experimental treatment. In no case was there present a round cell infiltration such as has been described for local immune reactions. The conclusion is reached that the reaction to skin penetration was due to tissue injury by the larvae and not to an immune reaction to the larvae themselves." C. L.

FÜLLEBORN (F.). Ueber die durch die Larve von *Ancylostoma caninum* verursachten Hauterscheinungen. [**Skin Eruptions caused by Larva of *A. caninum*.**]—Reprinted from *Scritti Medici in Onore del Sen. Prof. U. Gabbi* (*Giorn. di Clin. Med.*). 1930. pp. 37–43. With 1 plate. [10 refs.]

Fülleborn describes symptoms following the penetration into his skin of, so he concludes, a single larva of *A. caninum* in August 1929. After handling dog's food containing many larvae of this hookworm he experienced near the nail of the left middle finger an itching which his experience with penetration of strongyloides larvae made him believe to be ominous. Four days later there was swelling over the middle joint, but excised skin showed nothing, yet 2 hours later, iodine having been applied, it was judged that the larva could be felt above the metacarpophalangeal joint and half an hour later there was swelling on the radial side of the little finger. A week later the back of the hand swelled, the swelling spreading in 3 days to the forearm and middle finger with vesiculation and bruising, and about a fortnight after its onset the swelling had reached the arm. A surgical colleague feared there was septic infection. Penetration of *A. caninum* larvae into another person's skin was without any clinical signs. Fülleborn points out that repeated strongyloides infections have made his own skin very sensitive, so that a typical wheal follows vaccination with dried *A. caninum* substance.

C. L.

AFRICA (Candido M.). **Studies on the Activity of the Infective Larvae of the Rat Strongyloid, *Nippostrongylus muris*.**—*Jl. Parasitology*. 1931. June. Vol. 17. No. 4. pp. 196–206.

This has an interest and importance in its analogies with the behaviour of hookworm larvae. The infective larvae of *N. muris* are inveterate migrants. Travel of eight inches both vertically and laterally was actually observed and it is noted that probably many times this distance can be covered, but that moisture conditions must be optimum. Larvae were found on the glass walls outside a water trap 2 inches wide and 2 cm. deep. Since those larvae [like hookworm larvae] cannot swim, they must not only have crossed the trap by crawling along its bottom [like hookworm larvae] but, so it is held, must have crawled vertically up the smooth glass sides under water [and have pierced the resistance of the surface tension with nothing to push against, which hookworm larvae cannot do although with a little assistance from say cotton fibrils they evidently can]. It is believed that larvae are negatively heliotropic, but account is not taken of the possible lethal effects of sunlight which HEYDON [this *Bulletin*, Vol. 26, p. 554] proved for hookworm larvae.

C. L.

ESPIÉ (A.). Premier cas tunisien de *Strongyloides stercoralis*, Bavay. [**First Case in Tunis of *S. stercoralis* Infestation.**]—*Arch. Inst. Pasteur de Tunis*. 1931. Dec. Vol. 20. No. 3. pp. 317–320.

In about 1,000 examinations in the author's laboratory this is the first occasion on which *Strongyloides* larvae have been detected; nor have other observers in Tunis reported otherwise. The larvae measured in general 230 to 280 μ long by 15 to 16 μ wide and had the characters of *Strongyloides* larvae as given in text-books.

C. L.

MATONO (A.). Entwicklungsstudien über die *Strongyloides stercoralis*. (II. Mitteilung.). [Development of *S. stercoralis*.]—*Fukuoka-Ikwad-aigaku-Zasshi*. 1931. Oct. Vol. 24. No. 10. [In Japanese. German summary pp. 101–102.]

Cell division, apparently of the egg, is described in detail. It is particularly noted that it does not fit into the usual scheme of metazoa, in that it does not follow that of nuclei; for multinucleated daughter cells result, pointing to parthenogenesis. C. L.

SCHUCHAT (J. A.). Die diagnostische Methode von Fülleborn, die Methode der Perianalabstriche und Dehelminthisation als Invasionsindexe des *Enterobius vermicularis* Leach. 1853. [Diagnostic Methods for *E. vermicularis*.]—*Rev. Microbiol. Epidémiol. et Parasit.* 1931. Vol. 10. No. 2. pp. 203–213. [28 refs.] [In Russian. German summary pp. 213–214.]

Schuchat compared techniques for the diagnosis of *Enterobius*, namely that of FÜLLEBORN [presumably the Hamburg cover glass method] and that of perianal or rectal smears, both seeking eggs; and the search of stools for the threadworms themselves after an anthelmintic, the drugs used not being noted in the abstract. The first gave positive percentage results in 19·8 per cent. of children in boarding schools, in 3·2 of children not in these and in no adults. Corresponding figures for the second method were 62·7, 35·5 and 33·3, and for the third 79·8, 58·1 and 37·5. The totals of those examined by the 3 methods were 299, 299 and 196. Tests of material from under the nails and from the nasal mucosa should not be preferred unless for some reason the other tests cannot be used. C. L.

FENG (Lan-chou). Filariasis in China with Special Reference to its Distribution and Transmission.—*Nat. Med. J. China*. 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 464–474. With 4 figs. on 1 plate. [15 refs.]

The author's work concerns itself essentially with the unhappy Woosung district near Shanghai. Five mosquitoes here are essentially domestic: *Anopheles hyrcanus sinensis*, *Culex taeniorrhynchus*, *C. pipiens*, *Aedes albopictus*, and *Armigeres obturbans*. Filarial larvae do not reach the infective stage in the last three. In central Woosung Chen most mosquitoes in July and August were *C. pipiens*; 13 per cent. were infected but never with infective larvae. In the town and neighbouring villages 16·6 per cent. of *A. h. sinensis* were positive for filarial larvae, 16 per cent. of the larvae being infective. The course of development in this last is traced. Preventive measures are discussed. C. L.

RAO (S. Sundar) & IYENGAR (M. O. T.). The Escape of the Filaria Larva from the Proboscis of *Culex fatigans*.—*Indian J. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 941–944. With 4 figs. on 1 plate.

A *Culex fatigans* infected with *Mf. bancrofti* was fed on a volunteer, stunned by a shake, and put on a slide with a small cover lightly laid on.

it to prevent its escape should it recover. While being examined a larval filaria began to emerge from the extreme tip of the labella at first slowly and then more rapidly. Within a few seconds of the commencing of emergence, and when rather more than half was outside the proboscis, it was killed by Bles solution and the specimen preserved. Emergence was non-traumatic, and not through Dutton's membrane.

C. L.

- i O'CONNOR (F. W.) *Filaria bancrofti*—**Destruction of Adult and Embryo in Man.** [Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Jan. 30. Vol. 25. No. 4. pp. 227-228.
- ii. FAIRLEY (N. Hamilton). **The Skin Test and Complement Fixation Reactions in Filariasis.** [Demonstration.]—*Ibid.* pp. 220-221.

These two demonstrations illustrated pathological changes and antigen based tests in filariasis.

i. This demonstration fell into 3 series—*a.* Sections of adult worms : in some, healthy female worms had the anterior parts of the uteri crammed with sheaves of straightly extended microfilariae, in others the death of worms was shown as caused by clotted lymph or obliteration of the lymphatic by polypoidal encroachment of hypertrophied endothelial layer. *b.* Death of microfilariae by calcification and fracture in lymph glands, this often being accompanied by necrosis of the surrounding gland tissue. Microfilariae were shown in the afferent lymph vessels ; none have been found in the efferent ones. *c.* Death of microfilariae in masses in polyp-like growth of granulation tissue at the reflection of the tunica vaginalis—a veritable microfilarial cemetery. Since O'Connor had found 50 parent worms in examination of restricted areas of persons showing merely enlarged groin glands or small hydroceles, MANSON'S belief in hyperfilariation was amply confirmed.

ii. This was a demonstration of the matters dealt with in this *Bulletin*, Vol. 28, p. 679—the skin test and complement fixation reactions.

It was pointed out that " natives coming from endemic areas often gave positive skin tests in the absence of collateral evidence of filarial infestation, the presumption being, in such instances, that they were old cases in which sensitisation followed by natural cure had occurred. It was pointed out that the excellent series of slides shown on behalf of Professor O'CONNOR fully bore out this theory of spontaneous recovery from *Filaria bancrofti*, for in them dead worms and embryos in various stages of disintegration were strikingly depicted."

Two contrasting elephantoid cases were shown. In one microfilariae had been present a year earlier and the skin test was markedly positive ; in the other both tests were negative, the man had never been in an endemic area but had several times been treated for streptococcal lymphangitis. A loa case showed both tests markedly, while a control with ulcerative colitis had no reaction to intradermal antigen reaction, but one closely resembling that which appeared in the loa case was induced by the injection of histamine, thus confirming LEWIS'S hypothesis.

C. L.

- i. RODHAIN (J.). Les filaires de l'Afrique tropicale ; rôle pathogène. Les réactions allergiques qu'elles provoquent et le diagnostic de celles-ci. [*Filariae of Tropical Africa ; Pathogenicity and Allergic Reactions.*]—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 882-897. [13 refs.]
- ii. — & DUBOIS (A.). A Contribution to the Study of Intradermal Reactions in Human Filariasis.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 377-382.

i. Rodhain deals with *L. loa*, *O. volvulus* and *A. perstans* which are stated to be allied not only anatomically, but from the biological standpoint, in that the embryos of all circulate in the hope of being absorbed by an invertebrate blood sucker. Regarding *L. loa* he has identified as such partly calcified worms encysted in the mesentery but without any surrounding inflammation ; living or dead, these worms are held to produce no appreciable reaction, even those found in abscesses are held to have no share in their formation. Regarding *A. perstans* the only lesions he has seen are Calabarlike swellings or erysipelatoid swellings of the feet disappearing on rest. The production of an abscess by *O. volvulus* rests hitherto, it is affirmed, on the single case reported by Dyce SHARP and the possibility of infection without nodule formation is cited as needing more research ; urticarial pruritus occurred in 3 of 9 Europeans and was localized to the neighbourhood of a nodule ; eosinophilia has varied from 4 to 35 ; HISSETTE's report [*ante*, p. 83] of cranial nodules and ocular complications in part of the Belgian Congo, the condition supposedly typical of Central America, is referred to. It is held as thoroughly established that elephantiasis is the result of recurrent microbic, especially streptococcal, lymphangitis, that the rôle of the filaria is limited to favouring lymphatic obstruction, and that in onchocerca infection this is produced in the *lymph capillaries** by microfilariae ; but the very different incidence of elephantiasis associated with onchocerciasis in different regions shows the need for investigation. " Lizard skin " was noted in one of 9 infected Europeans and an excised portion showed sparse microfilariae with diffuse leucocytic infiltration. Following further discussion there are reported the results obtained by the use of the dirofilaria antigen supplied by FAIRLEY [*ante*, p. 83], the full report being considered below.

ii. After recapitulating tests already reported [*ante*, p. 83], those made by intradermal injection of 0.25, 0.2 and 0.1 cc. of Fairley's 0.5 per cent. dirofilaria antigen are described. In 6 cases of loa infection a typical positive immediate reaction followed. Delayed local reactions occurred ; in one case the site was dissociated from that of the injection. In 3 perstans infections there were equally definite immediate reactions, delayed reactions being added in two. Three cases of onchocerca infection were tested. In two the only visible nodule had been excised a year earlier ; both were given 0.1 cc. of the antigen ; there was a definite positive reaction in one and a partially positive one in the other. The third who had two nodules gave a positive reaction to 0.1 cc. of this antigen and, when a cyst was excised 8 days later, to 0.2 cc. of this and to 0.1 cc. of normal saline mixed with juice from the worm in the excised nodule. Of 15 controls, one gave a " pseudo-reaction " the wheal reaching 2.7 cm. in diameter.

* Italicized in original.

The routine injection of 0.25 cc. of antigen is advised. Microfilariae have been discovered in the skin of 3 of 4 onchocerca cases, two being without dermatosis.

[Rodhain's statement that the occurrence of onchocerca abscess rests on the single case of Dyce SHARP requires modification. At the Laboratory Meeting of the Royal Society of Tropical Medicine and Hygiene held in March, 1932, Dr. C. C. CHESTERMAN, who has courteously furnished the information of which this is an abstract, showed a female and several male *O. volvulus* which had been removed from one of a number of abscesses in a negro coming from near Stanleyville, in Belgian Congo. The other abscesses showed no trace of worms. Dr. CHESTERMAN showed also an elephantoid scrotum weighing 1 lb., convoluted like a brain, with subcutaneous tissue more solid and less oedematous than that commonly attributed to *F. bancrofti* in this region, and showing larvae of *O. volvulus* in the skin. He points out that BRUMPT in his "Précis de Parasitologie" mentions the occurrence of this worm in abscess cavities.] C. L.

GALLIARD (H.). Recherches sur les filarioses au Gabon occidental. [Filariases in Western Gabon.]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 167-174. [13 refs.]

In Gabon, lying just south of the equator in French Equatorial Africa, infections by *Loa loa* and *Acanthocheilonema perstans* are common but, especially the former, less common than in adjacent regions. The percentage of infected was found to vary greatly even in areas close to one another, so that at certain points in the forest nearly all were infected, at others women and children seemed to escape. In general, children between 5 and 12 were the most infected with *A. perstans*, and old people little so. Elephantiasis and onchocerca tumours were rare. *Mf. bancrofti* has not been detected. C. L.

DE LA TORRE (Ignacio). Sur l'onchocercose au Mexique. [Onchocerciasis in Mexico.]—*Bull. Office Internat. d'Hyg. Publique.* 1931. Nov. Vol. 23. No. 11. pp. 2017-2020.

The infected number 15,000 in the State of Chiapas and 5,000 in that of Oaxaca. Failure of extirpation of nodules to produce cure is attributed to the carelessness of the sick. The campaign now takes the form of travelling brigades with doctor and entomologist. Their difficulties are pointed out and include the widespread diffusion in streams of simulum larvae and the impossibility of moving these brigades about during the rainy season. C. L.

SILVA (Raphael). Ocular Onchocercosis.—*Southern Med. Jl.* 1932. Feb. Vol. 25. No. 2. pp. 113-117.

The progressive clinical and anatomical changes in the eye are minutely described. Some have implications of general as apart from specialist interest. In 1925 Silva after several examinations of an eye which had slight loss of clarity of vision saw "in the vitreous humor a filiform body of extraordinary refringence having the approximate size of three papillary diameters, with spontaneous movements. This body was golden on a red background with ordinary illumination and silver on a blue background on anerythral illumination. With Gullstrand's

ophthalmoscope I could see the shadow of this moving body." He believed this to be a filaria. Having found microfilariae in the choroid and posterior two-thirds of the cornea in sections of eyes, "Torroella could confirm his finding *in vivo* with Koeppe's microscope on seeing microfilariae creeping on the corneal surface. The parasites can be discovered in the anterior chamber or in the iris as worm-like organisms with active movements and changing forms of 8, 6 spirals." Then having found that plasmochin solution, 1 in 1,000, had no ill effect when injected into the anterior chamber of rabbits "he tried it on onchocercosis patients, observing with the corneal microscope the death of the parasites." He has seen good results on the eye troubles after removal of adjacent onchocerca cysts, but adds that microfilariae will continue to live inside the structures of the eye and that he has seen them living a year after extirpation of the cysts. This seems to imply Silva's belief that these microfilariae have come from the adult worms excised with the cysts, so it is well to note that he adds:

"Unfortunately, one year and a half after operating upon a patient in Mexico City, where no transmissible agents are found, we have seen new cysts appear and the microfilariae still abundant in the subcutaneous tissues." C. L.

MOHAMMED (Abdel Shafi). **The Transmission of Human and Bovine Onchocerciasis.**—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 509-519. [2 refs.]

This is a historical survey. At the end the point is made that as BLACKLOCK showed [this *Bulletin*, Vol. 24, p. 531], the distribution of nodules in the African and American forms of *O. volvulus* seems explicable on the habits of man and simulum, and this conclusion has now been strengthened by the discovery that a simulum is responsible for transmission in America. It is suggested that adequate investigation of simulum in Australia is the necessary preliminary to prevent the heavy annual loss involved in the formation of *O. gibsoni* nodules in cattle there. C. L.

RAYNAL (Jean). Sur une méthode pratique de recherche des microfilaries dans le derme, chez les sujets atteints d'onchocercose du Guatemala. [**Demonstration of Microfilariae in the Dermis in Onchocerciasis.**]—*Marseille-Méd.* 1931. Dec. 25. Vol. 68. No. 36. pp. 821-822.

The method is to pick up with forceps a piece of skin near an onchocerca nodule or the edge of the chronic thickening which follows an erysipelatoid lesion, snip it off including dermis with fine scissors, place it for not less than 10 to 15 minutes in normal saline at 30° to 37°C. and pipette off the bottom layer with the microfilariae which have escaped from the tissue. The centrifuge makes richer preparations. C. L.

GUTIÉRREZ V. (Luis). La fijación del complemento con sangre de enfermos de onchocercosis. [**Complement Fixation with the Blood of Onchocerciasis Patients.**]—*Rev. Mexicana de Biol.* 1931. Jan.-Feb. Vol. 11. No. 1. pp. 1-8

Onchocerca nodules were digested in artificial gastric juice to liberate the parasites which were subsequently well washed, dried between filter

papers, and thoroughly triturated with different solvents including physiological saline and alcohol. In addition a third batch of antigen was prepared as an alcoholic extract of the acetone and ether insoluble residues. The total mixture, i.e., liquid and sediment as well as the clear supernatant fluid after centrifugation, was tested for antigenic properties with each of the three extracts. In the test itself a little less than 1/10 of the anticomplementary dose was used. As only the saline extract yielded consistently negative reactions with normal sera, a 2 per cent. saline extract left for 8 days in the refrigerator was employed in the subsequent tests. With this antigen positive reactions were obtained in all cases suffering from onchocerciasis as well as from syphilis and mal de pinto.

Gutiérrez concludes that these results indicate the presence of onchocerca antibodies in the blood and suggests that the false reaction obtained in syphilitics are probably due to defective technique, but until this source of error has been eliminated the reaction can have no diagnostic value in onchocerciasis.

[Any alcoholic extract of tissue or parasite acts to a variable degree as a Wassermann antigen when used in sufficient concentration. It therefore becomes essential to standardize these helminthic extracts in the presence of strongly positive Wassermann sera, subsequently using a dilution of antigen well outside the zone of positive reaction with syphilitic sera. If the potency of the extract, considered as an helminthic antigen, is not sufficient to stand this dilution it cannot be regarded as a satisfactory antigen for diagnostic serological work.]

N. Hamilton Fairley.

VOGEL (Hans.). Onchocercosis und Augenerkrankungen in Mexiko und Guatemala. [**Onchocerciasis and Eye Affections in Mexico and Guatemala.**]—Reprinted from *Med. Welt*. 1931. No. 25. 7 pp. [Inst. for Ship & Trop. Diseases, Hamburg.]

A survey of the literature dealing with the subject.

C. L.

OWEN (H. B.) & HENNESSEY (R. S. F.). **A Note on Some Ocular Manifestations of Helminthic Origin occurring in Natives of Uganda.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Jan. 30. Vol. 25. No. 4. pp. 267–273. With 1 text fig.

A number of cases have been seen with yellow, circular nodules about 2 mm. in diameter on the bulbar conjunctiva associated with oedema of the lids and proptosis. Section of excised nodules showed that they consisted of inflammatory tissue, with necrotic areas surrounded by a zone of endothelial cells, some being multinucleated. No bacteria were found in them and a guineapig remained well after inoculation with a nodule. Within the necrotic areas there might be clear spaces which in turn might be occupied by a parasite 0·07 mm. in diameter. Its identification with *Thelazia* or *Habronema* is discussed, the latter being dismissed on the ground that longitudinal crests are not obvious in the sections made. [It must then be some artefact which gives the impression in the microphoto illustrated.]

C. L.

NORONHA (A. J.). **A Note on a Filarial Worm found in Sections of a Nasal Tumour excised from a Child, with Special Reference to the Embryo.**—*Jl. Trop. Med. & Hyg.* 1932. Mar. 1. Vol. 35. No. 5. pp. 74–76. With 6 figs. (5 on 1 plate).

Further study has been made of the worm already described [*ante*, p. 84]. The uterus fills the entire coelomic cavity and is filled with embryos. These have no sheath, it is now concluded, the bodies originally reported as such being apparently embryos in various stages of degeneration. The embryo is transversely striated with a gradually tapering tail and resembles that of *D. medinensis* [as does the whole genital system.] C. L.

SHERWANI (A. H. K.). **Neostibosan in Chyluria.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. pp. 83–84.

An intermittent haematochyluria with microfilariae cleared up after intramuscular injections of neostibosan. In all, ten injections were given, the first three when the man was an in-patient, the others when an out-patient, the dose rising from $\frac{3}{4}$ grain to 5 grains [0.3 gm.]. The editor notes that RAO is preparing for publication a paper which confirms this action of neostibosan. C. L.

GHOSH (P. K.). **Microfilariae in the Sputum.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. p. 84.

Two cases are cited where microfilariae were found in blood-stained sputum coughed up in the early morning. In one, acid fast bacilli were found; in a third, what was believed to be a filarial sheath. In relation to Ghosh's note that he knows of no mention of this condition in recent literature, an editorial note draws attention to a case published in 1923 [*this Bulletin*, Vol. 20, p. 631]. C. L.

BACIGALUPO (Juan). Importance du sondage duodénal dans le diagnostic et le traitement des distomatoses hépatiques.—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 670–672. [3 refs.]

BARNEOD (J.). La bilharziose vésicale dans le Sud Marocain.—*Arch. Inst. Pasteur d'Algérie.* 1931. Sept. Vol. 9. No. 3. pp. 476–480. [7 refs.] [Bureau of Hyg., Marrakech.]

FIESCHI (A.). Le anemie da anchilostoma.—*Haematologica.* Pavia. I. Arch. 1932. Vol. 13. No. 2. pp. 145–167. [40 refs.] French summary.

GULATI (A. N.). Is Paragonimiasis likely to spread in India?—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 761–764. With 1 map in text. [12 refs.]

HU (Stephen M. K.). Studies on Host-Parasite Relationships of *Dirofilaria immitis* Leidy and its Culicine Intermediate Hosts.—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 614–629. With 5 figs. [8 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

ICASIANO (M. C.). Specific Suggestions for the Control of Intestinal Parasites among School Children.—*Monthly Bull. Philippine Health Serv.* 1931. June. Vol. 11. No. 6. pp. 294–305.

KHAW (O. K.). Historical Notes on *Fasciolopsis buski* (Lankester, 1857) Odhner, 1902.—*Nat. Med. Jl. China.* 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 475–487. [35 refs.] [Peiping Union Med. College, Peking.]

- KODAMA (T.). On a Rhabditis Type Parasite which was discovered during Health Examination of School Children in Kanagawa Prefecture.—*Jl. Public Health Assoc. Japan*. 1931. Nov. Vol. 7. No. 11. pp. 2-4.
- DE LANGEN (C. D.). Verschijnselen aan hart en bloedvaten bij de mijnworm-ziekte.—*Nederl. Tijdschr. v. Geneesk.* 1932. Jan. 2. Vol. 76. No. 1. pp. 13-18.
- LARROUSSE (F.). Parasites vermineux, cristaux fuchsinophiles acido-résistants et réactions hyperplasiques.—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. pp. 666-668. With 2 text figs. [1 ref.]
- MOTAIS (F.). Considérations sur la pathogénie de la sparganose oculaire.—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 915-919.
- MÜLLER (Giuseppe). Un focolaio di anchilostomiasi fra contadini in Provincia di Ancona.—*Arch. Ital. Sci. Med. Colon.* 1932. Feb. 1. Vol. 13. No. 2. pp. 108-116. English summary (5 lines).
- NAGOYA (Takeguma). Fate of *Anchylostoma caninum* Larvae Orally or Percutaneously Transmitted to the Proper Host, Dog fed on Vitamin Deficient Diet. (First Report.) Experiment on Puppies fed on Vitamin A Deficient Diet. (Second Report.) Experiment on Puppies fed on the Diet Deficient in Vitamin B. (Third Report.) Histological Investigation on Puppies fed on Vitamin A Deficient Diet, those fed on Vitamin B Deficient Diet and those fed on Normal Diet. (Fourth Report.) Experiment on the Normal White Mouse, White Mouse fed on Vitamin A Deficient Diet and White Mouse on Vitamin B Deficient Diet.—*Japanese Jl. Experim. Med.* 1931. Dec. 20. Vol. 9. No. 6. pp. 573-585. [23 refs.]; pp. 587-593. [2 refs.]; pp. 595-602. [6 refs.]; pp. 603-611. [Govt. Inst. for Infectious Diseases, Tokyo.]
- NAKAJIMA (Katsumi). Experimental Study on the Development of *Anchylostoma duodenale*. (First Report.) Development in the Rabbit of Larvae of *Anchylostoma duodenale* Dubino previously treated with the Cell Emulsion of Human Organs.—*Japanese Jl. Experim. Med.* 1931. Dec. 20. Vol. 9. No. 6. pp. 553-568. With 14 figs. on 2 plates. [Govt. Inst. for Infectious Diseases, Tokyo.]
- NAKAJIMA (Katsumi). Experimental Study on the Development of *Anchylostoma duodenale*. (Second Report.) The Development of Larvae of *Anchylostoma caninum* Ercolani in the Normal Host, Dog, and in the Abnormal Hosts, Rabbit, Guinea Pig, and White Rat.—*Japanese Jl. Experim. Med.* 1931. Dec. 20. Vol. 9. No. 6. pp. 569-572. With 10 figs. on 2 plates. [7 refs.] [Govt. Inst. for Infectious Diseases, Tokyo.]
- PITTALUGA (G.) & GOYANES (J.). Contribucion al estudio de la *Onchocerca volvulus*.—*Medicina Paises Calidos*. Madrid. 1932. Mar. Vol. 5. No. 2. pp. 124-153. With 12 text figs. and 12 figs. on 2 plates. [2 pages of refs.]
- SUZUKI (S.). Researches into the Life-History of *Fasciola hepatica* and its Distribution in Formosa, especially on the Determination of the First Intermediate Host and Some Experiments with Larvae Freed from their Cysts Artificially.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1931. Dec. Vol. 30. No. 12 (321). [In Japanese. With 3 plates. English summary pp. 97-100.] [Med. College, Taihoku, Formosa.]
- TUBANGUI (Marcos A.). Worm Parasites of the Brown Rat (*Mus norvegicus*) in the Philippine Islands, with Special Reference to Those Forms that may be transmitted to Human Beings.—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 537-591. With 19 text figs. [63 refs.]

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XVII.*

Eyelids.—For the relief of *spastic entropion* HUGHES¹ recommends alcohol injection into the outer portion of the orbicularis muscle near its attachment in the lower lid to the external palpebral ligament. The needle is passed through the muscle fibres close to the margin of the lower lid for a distance of 4 or 5 mm. and five minims of novocaine solution is injected. The syringe is now detached from the needle, which is left in place, and a fresh syringe containing ninety-five per cent. alcohol is fitted. About five minims of alcohol is then injected into the tissues. The procedure is stated to be painless.

Conjunctiva.—OWEN & HENNESSEY² have found the condition of "bung-eye" and "bulge-eye" to be frequently associated with the formation of small, yellow nodules in the bulbar conjunctiva. These nodules are circular, raised and yellow, and average about 2 mm. in diameter. They are situated in the deeper layers of the conjunctiva in close relationship with the episcleral tissue. They usually lie fairly close together and cause but little inconvenience. Examination of the nodule revealed in many cases the presence of a nematode worm, the zoological status of which has not yet been determined, though possibly it may belong to the genus *Thelazia*. Several of the cases presenting nodules were also affected with "bung-eye" or "bulge-eye" or with both these conditions, and the authors consider the worm to be the cause of all these diseases.

Trachoma.—PILLAT³ urges ophthalmologists in China to adopt a simple, definite scheme when considering and reporting on the characteristics of the disease in that country, in order that its incidence may be properly estimated and effective measures against it instituted. He suggests a questionnaire which contains ten main headings with various subdivisions. These concern the age, sex and occupation of the patient, the type of the disease and the presence and character of complications and of secondary infections. He remarks: "Far too often in the literature of the subject trachoma is made responsible for blindness generally, and especially so in a country like China where trachoma as a whole has a mild character and a tendency to eliminate itself."

MEYERHOF⁴ has furnished a most interesting review of the epidemics of ophthalmia which afflicted the English, French and Turkish armies during the fighting in Egypt at the time of the Napoleonic war. As long ago as the fourteenth century an Egyptian oculist remarked, "the inhabitants of Egypt are more frequently attacked by ophthalmia

* For the Sixteenth of this series see Vol. 28, pp. 965-972.

¹ HUGHES (Wendell L.). Spastic Entropion; a Simple Procedure for its Cure.—*Amer. J. Ophthalm.* 1931. Jan. Vol. 14. No. 1. pp. 34-35.

² OWEN (H. B.) & HENNESSEY (R. S. F.). A Note on Some Ocular Manifestations of Helminthic Origin occurring in Natives of Uganda.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Jan. 30. Vol. 25. No. 4. pp. 267-273. With 1 text fig.

³ PILLAT (A.). Trachoma in China. Proposals for a Uniform Recording and for Uniform Statistics.—*Nat. Med. J. China.* 1931. Dec. Vol. 17. No. 6. pp. 755-763.

⁴ MEYERHOF (Max). A Short History of Ophthalmia during the Egyptian Campaigns of 1798-1807.—*Brit. J. Ophthalm.* 1932. Mar. Vol. 16. No. 3. pp. 130-152. [3 pages of refs.]

than other people on account of the abundance of dust and sand in their land," and in the sixteenth century an Italian physician noted the seasonal character of the epidemics. The author states that genuine trachoma is frequently a complication or sequela of an acute catarrhal or of an acute or chronic purulent conjunctivitis, and it may exist as a primary disease or develop slowly after the healing of the acute condition. The destructive character of the epidemics under consideration was due to gonococcal infections. Extragenital transmission occurs in hot climates.

MICHAIL & VANCEA⁵ recognise that it is unsafe to draw conclusions from trachoma produced experimentally on animals other than man and perhaps the anthropoid apes. Inoculation of human volunteers has suggested to them that the incubation period of the experimental form of the disease is from five to seven days. The experimental disease has definite acute and subacute stages at its commencement and thus differs from the naturally acquired disease. Inoculation to be successful must be made on the surface of the conjunctiva. Failure to infect two volunteers from trachoma tissue obtained from patients with only one eye diseased has led them to consider whether trachoma affecting one eye only is really trachoma at all. BARONI & MICHAIL⁶ have found that the virulence of trachoma virus can be well preserved in a mixture of equal parts of glycerine and Tyrode liquid kept at 60°C. and in human plasma at room temperature. Human plasma when inactivated is the best medium. Aqueous humour of rabbits and the plasma of dogs proved quite unsuitable.

DIXON⁷ has found trachoma fairly prevalent amongst the negroes at Tshibambo in Katanga. During eighteen months he treated no fewer than 251 cases of the disease in his hospital there. Twenty-nine per cent. of the patients suffered from pannus and thirty-six per cent. had trichiasis. The negro does not readily submit to a prolonged treatment, and, owing to his tolerance of ocular discomfort, is likely to regard himself as cured before the course is completed. Pigmentation is sometimes observed in the late stage of the disease. The adoption of European habits by the natives of the country is conducive to the spread of trachoma owing to the use of dirty handkerchiefs, towels and pillow-cases. TSUKAHARA⁸ has examined over fifteen thousand school-children in Taihoku, (more than half being Chinese resident in Formosa and the remainder Japanese), and furnished statistics relating to the occurrence of trachoma amongst them. Nearly twenty-three per cent. of the scholars were infected; but less than half of these made any complaint of eye defect, and only a small proportion (29 per cent.) were undergoing any treatment. Those whose school standard was "good" showed an incidence of 17 per cent. infection, "fairly good" 23.5 per

⁵ MICHAIL (D.) & VANCEA (P.). Quelques faits expérimentaux concernant le trachome.—*C. R. Soc. Biol.* 1931. Oct. 16. Vol. 108. No. 28. pp. 286-287.

⁶ BARONI (V.) & MICHAIL (D.). Recherches sur la conservation du virus trachomateux.—*C. R. Soc. Biol.* 1931. Oct. 16. Vol. 108. No. 28. pp. 289-290.

⁷ DIXON (Patrick K.). Notes sur le trachome.—*Bull. Méd. au Katanga.* 1931. Vol. 8. No. 5. pp. 131-140. [10 refs.]

⁸ TSUKAHARA (Y.). Ergebnisse der Trachom-Untersuchung bei Schulkindern in Taihoku, insbesondere ueber den Einfluss des Trachoms auf die Schulerfolge der Kinder, sowie die z. Z. lokal übliche Trachom-Behandlung. *Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1931. Nov. Vol. 30. No. 11 (320). [In Japanese. German summary p. 91.]

cent., and "satisfactory" 23.9 per cent. The author pleads for the better education of the public in hygienic matters in general and in the dangers of trachoma in particular.

HARSTON⁹ has again insisted upon the value of ultra-violet rays in the treatment of trachoma. He uses a 6-10 ampere tungsten arc lamp and places the patient at a distance of three feet from it. The eyes are irradiated through the closed lids for a period of from two to three minutes. Adrenalin is instilled in order to render the lids as bloodless as possible. The treatment is repeated at three-day intervals.

The *Revue Internationale du Trachome* for October 1931 contains, in addition to articles previously published elsewhere and already reviewed, a note by JUNÈS¹⁰ upon the results of the anti-trachomatous measures undertaken by him in the schools of Sfax in Tunis. Amongst the European scholars these results were remarkably favourable, and the percentage of those affected by the disease fell from 25 per cent. to 4 per cent. in the year 1929-1930. The florid type of trachoma was almost completely eradicated from these schools. Success in the Arab schools was also marked but less striking. In the first year the incidence fell from 50 per cent. to 33 per cent. and in the second year from 35 per cent. to 25 per cent. The difference is accounted for by the more unfavourable home surroundings of the Arab scholars. The benefits of this campaign were not confined to the schools in which it was conducted but affected the whole population since the seasonal epidemics of acute conjunctival inflammations became much milder in character. In the issue for January 1932 Donato CATTANEO¹¹ states that amongst 1,600 trachomatous patients he found 16 in whom only one eye was affected. Careful examination with the slit-lamp, however, revealed that the apparently healthy eye was also affected but so mildly as to escape observation by the ordinary methods of examination. [It is important when dealing with an apparent trachoma affecting only one eye to make certain that the conjunctival condition is not a manifestation of some constitutional trouble such as syphilis, focal sepsis, or the "tuberculous diathesis."] V. MORAX¹² discusses the relationship between swimming-bath conjunctivitis and trachoma together with the significance of inclusion bodies. TALBOT¹³ reports on the prevalence of the disease in Southern Tunis. The infected scholars there vary from 53 per cent. in some districts to 97 per cent. in others. The majority of the districts show an incidence of between 70 and 80 per cent. E. REDSLOB¹⁴ has analysed the figures relating to the health of the Alsatian soldiers conscripted by Germany in the war. Most of these were, for political reasons, employed on the

⁹ HARSTON (Montagu). Ultra-Violet Ray Treatment of Trachoma.—*Brit. Jl. Ophthalm.* 1931. Dec. Vol. 15. No. 12. pp. 717-718.

¹⁰ JUNÈS (E.). Note sur les résultats de la lutte anti-trachomateuse poursuivie dans les écoles de la ville de Sfax de 1929 à 1931.—*Rev. Internat. du Trachome.* 1931. Oct. Vol. 8. No. 4. pp. 230-236. With 3 diagrams.

¹¹ CATTANEO (Donato). Sul tracoma unilaterale.—*Rev. Internat. du Trachome.* 1932. Jan. Vol. 9. No. 1. pp. 1-8.

¹² MORAX (V.). Conjonctivite folliculaire dite de piscine. Notes de laboratoire.—*Rev. Internat. du Trachome.* 1932. Jan. Vol. 9. No. 1. pp. 8-12.

¹³ TALBOT. Trachome dans les territoires militaires du sud tunisien.—*Rev. Internat. du Trachome.* 1932. Jan. Vol. 9. No. 1. pp. 12-19.

¹⁴ REDSLOB (E.). Le trachome des soldats alsaciens transportés au front russe.—*Rev. Internat. du Trachome.* 1932. Jan. Vol. 9. No. 1. pp. 24-27.

Eastern front and passed several years in Poland and Russia. About 200,000 Alsations were thus brought into intimate contact with the inhabitants of countries heavily infected with trachoma. Yet it is surprising to find that only three of the soldiers contracted trachoma on this front. He suggests (1) that Alsations are particularly resistant to the disease, (2) that the adult age of the soldier rendered him less likely to contract the complaint, (3) that the European type of the disease is less virulent than the North African. ROQUES¹⁵ has found the Jewish quarter in Rabat (Morocco) a nidus of trachoma. As elsewhere the schools form a fruitful source of infection; the number of infected scholars varies from 26 to 85 per cent. according to the hygienic standard of the institution. Those schools which are associated with the synagogues show the highest rate of disease.

JANAWOSKA¹⁶ discusses the question of the mutual relationship of tubercle and trachoma. He examined five hundred tuberculous patients in Kiev and found amongst them only five trachomatous subjects, and even in these the eye disease was of a mild type. Nuri FEHMI¹⁷ also writes on this subject and reports the successful employment of tuberculin therapy in a case of acute trachoma with pannus. He regards the existence of lymphatism as a contributing and aggravating cause; hence the success of tuberculin treatment. [It should be noted that a phlyctenular type of conjunctival inflammation may sometimes simulate trachoma.]

Cornea.—EL-TOBGY and WILSON¹⁸ have had good results from platinum chloride in *tattooing corneal leukomata*. They have followed the method described by KRAUTBAUER. Two solutions are used. The first is a two per cent. solution of platinum chloride (tetravalent) in sterile water. This solution is not stable if exposed to light. The second is a two per cent. watery solution of hydrazine hydrate freshly prepared. The eye is cocaineized and washed with sterile water. The surface of the leukoma is denuded of epithelium with a Graefe knife. The platinum solution is applied to the denuded area for two minutes. The application is made by means of a wool mop and care is taken to prevent any excess solution from flowing on to the healthy cornea. On removing the mop the hydrazine hydrate solution is dropped continuously on to the leukoma for twenty or twenty-five seconds. About ten drops usually suffice. The eye is then washed out with sterile distilled water. Reduction should be complete in two minutes when the eye is flooded with saline solution and the dressing applied.

The same observers¹⁹ have reported their experience of the use of phenolaine in the treatment of *corneal nebulae*. Forty patients underwent the course of treatment and every care was taken to eliminate sources of error in estimating any benefit derived. The majority of the

¹⁵ ROQUES. Un foyer important de trachome à Rabat (Maroc). Note sur l'activité du dispensaire antitrachomateux Israélite au cours de l'année 1930.—*Rev. Internat. du Trachome*. 1932. Jan. Vol. 9. No. 1. pp. 36-40.

¹⁶ JANAWOSKA. Le trachome et la tuberculose.—*Rev. Internat. du Trachome*. 1932. Jan. Vol. 9. No. 1. pp. 47-52.

¹⁷ FEHMI (Nuri). La tuberculinothérapie dans le trachome.—*Rev. Internat. du Trachome*. 1932. Jan. Vol. 9. No. 1. pp. 44-45.

¹⁸ EL-TOBGY (A. F.) & WILSON (R. P.). Tattooing of the Cornea.—*Fifth Ann. Rep. Giza Memorial Ophthalmic Lab., Cairo*, 1930. pp. 97-102. With 4 figs. on plates 11 & 12. [12 refs.]

¹⁹ WILSON (R. P.) & TOBGY (A. F.). Phenolaine in the Treatment of Corneal Nebulae.—*Bull. Ophthalm. Soc. Egypt*. 1931. Vol. 24. pp. 117-122.

scars resulted from corneal ulceration following gonorrhoeal ophthalmia. Most cases showed some slight improvement in their vision after treatment, but this was accompanied by very little rarefaction of the scar tissue. It is concluded that phenolaine does not appear to possess any definite advantages in this respect over the ordinary remedies such as yellow oxide of mercury and dionine. The treatment, too, may sometimes give rise to undesirable sequelae.

HERBERT²⁰ argues that Wright's success in producing experimentally *Superficial Punctate Keratitis* by the use of filtrates of epithelial emulsion from the disease does not necessarily exclude the micro-organism described by himself in 1901 as being the real cause of the condition. During an epidemic of the disease the mere trauma of the corneal inoculation might permit the prevalent organism to attack successfully the tissues. (The references to Herbert's work are *The Ophthalmic Review*. 1901. Vol. xx. pp. 339-345, and *The Ophthalmoscope* 1904. Vol. ii. pp. 8 & 9.) Herbert emphasizes the very limited distribution of the organism in, or on, the corneal epithelium. To find it the cornea must be stained with two or three instillations of a strong solution of fluorescein and those areas which are stained most deeply should be selected for examination.

The prevalence of *Keratomalacia* in the Dutch East Indies is commented on by DE HAAS²¹ and the opinions of his countrymen regarding the disease are discussed by him. He found children between the ages of two and five years to be the most affected. He attributes the disease to the combination of bad hygienic conditions, unsuitable diet, ascariasis, intestinal and other infections and avitaminosis-A. The whole constitutes a vicious circle of disease. OWEN and HENNESSEY²² have published a very informative paper on the disease. They have had considerable experience of the condition in Uganda finding it common amongst the gaol population; the free villagers, however, seldom suffer from night-blindness, xerophthalmia and keratomalacia. The diet of these latter consists basically of plantains and sweet potatoes with some vegetables, nuts and fruits. Meat, milk, eggs, butter and ghee are consumed in negligible quantities. The prison diet consists of maize flour, dry beans, ground nuts, and a small quantity of meat supplemented by sweet potatoes. The authors report the case of a man aged about 20 who suffered from severe biliary cirrhosis, and in the course of the disease developed keratomalacia in both eyes although his ordinary diet was in no way deficient in accessory food factors. They believe that xerophthalmia occurred in this case as a result of interference with the part played by the liver in the metabolism of vitamins, the intake of the latter being ample. And they conclude that the liver is of primary importance in the process leading to the utilisation of ingested vitamin A by the tissue cells. Although vitamin A [deficiency] is the most important single factor in the causation of xerophthalmia and keratomalacia, it is linked with other

²⁰ HERBERT (H.). The Micro-Organism of Indian Superficial Punctate Keratitis.—*Brit. J. Ophthalm.* 1931. Nov. Vol. 15. No. 11. pp. 633-637.

²¹ DE HAAS (J. H.). On Keratomalacia in Java and Sumatra (in Particular upon the Karo-Plateau) and in Holland.—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1931. Vol. 20. Pt. 1. pp. 1-11. With 8 figs. on 5 plates. [20 refs.]

²² OWEN (H. B.) & HENNESSEY (R. S. F.). Keratomalacia in Liver Disease.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 367-375. With 2 figs. on 1 plate. [11 refs.]

factors, which in threshold cases may actually determine the onset of gross lesions.

Glaucoma.—ELLIOT²³ has published some hints for the general practitioner on the treatment of glaucoma. These are specially valuable coming from such an authority on the disease. The question of medical treatment versus operative is discussed and it is decided that each case must be judged on its own merits. No patient should be submitted to operation if judicious medical treatment suffices to keep the disease *in statu quo*. General principles for the preservation of good bodily health must be strictly observed by the glaucomatous patient; he must avoid over fatigue (though moderate use of the eyes is probably beneficial) and excesses of all kind. Such sources of strain as stooping are harmful. Local treatment consists in the use of miotics and in the employment of ocular massage; the importance of this latter measure is still insufficiently appreciated. An operation should be advised if treatment on these lines fails to control the disease. Failure is indicated by a maintenance of pathological tension as shown by the tonometer, by a progressive diminution of central vision, and by a progressive curtailment of the visual field. This latter is a symptom of grave significance. Failing light sense is another sign which must not be disregarded. Cupping of the optic disc is a less valuable indication than is a progressive contraction of the visual field. The patient's expectation of life and the rate of progress of the disease must be balanced against each other when weighing the question whether to operate. Once operation is decided upon, it should not be delayed; the earlier it is performed the better is the prognosis. It is important to keep the patient cheerful and in a hopeful frame of mind; therefore it is probably wiser to discuss the unfavourable aspects of any operation with his relatives only.

The same authority²⁴ has reviewed briefly the technique of the operation devised by him, and considered some of the possible complications. "Safety after operation depends largely on the thickness of the protective covering." Therefore it is important to keep as close to the sclera as possible when raising the wide-angled flap. The cornea should be split and not cut into with a sharp instrument. A sharp trephine blade should be used and interference with the uvea should be limited to the minimum. "So long as the trephine hole remains iris-free it does not really matter whether a piece of iris has been removed or not." As a rule the dangers involved in fishing for iris in the trephine hole are greater than those involved by the policy of letting well alone. A continuous suture is employed to unite the edges of the flap. Detachment of the choroid seldom causes serious trouble, and patients with this complication do better when not confined to bed. Thin prominent scars may be suitably treated by the application of silver nitrate solution. The pupil must be kept well dilated for some weeks after the operation.

GENERAL DISEASES.—**Onchocerciasis.**—SILVA²⁵ has briefly recorded the efforts made by the Public Health Department in Mexico to eradicate onchocerciasis. He considers that the disease is spread by sandflies,

²³ ELLIOT (R. H.). Some Points in Connexion with the Treatment of Glaucoma.—*Brit. Med. J.* 1931. Dec. 26. pp. 1169-1171.

²⁴ ELLIOT (R. H.). Some After-Thoughts on Trephining for Glaucoma.—*Amer. J. Ophthalm.* 1931. Oct. Vol. 14. No. 10. pp. 999-1004.

²⁵ SILVA (Rafael). Brief Statement concerning Onchocercosis in Mexico.—*Amer. J. Ophthalm.* 1931. June. Vol. 14. No. 6. pp. 518-519.

and that *S. avidum*, *S. mooseri* and *S. ochraceum* are the vectors in Mexico. The subcutaneous tumours principally occur in the hairy parts; and a plastic iritis and a punctate form of keratitis constitute the ocular complications.

VOGEL²⁶ has remarked the attention paid to onchocerciasis by Journals devoted to tropical helminthology and the descriptions of the widespread incapacity caused by the ocular disorders due to this disease. Fortunately some of the reports appear to exaggerate the evil. He has, therefore, summarized the experiences of ROBLES, HOFFMANN and other oculists who have met with the disease. The author describes the inflammations which affect the uvea and cornea and considers them due to an absorption of toxin from the parasite.

Syphilis.—KIRWAN²⁷ has found syphilis to be appallingly common in India and to be a frequent cause of loss of sight. Early and energetic treatment of ocular syphilis and of syphilis in general is therefore most important. Interstitial keratitis, iritis, irido-cyclitis, and optic atrophy are common ocular complications of the disease. A chronic conjunctivitis, due to syphilitic tarsitis, may be mistaken for trachoma. The routine treatment consists in weekly intramuscular injections of metallic bismuth and sulfarsenol. Arsenical preparations should be administered with caution and it is usually advisable to halve the dose in ocular syphilis.

The Fifth Annual Report of the Giza Memorial Laboratory contains a record of several interesting cases. Comprehensive post-graduate courses in ophthalmology are included in the activities of this well-equipped institution in addition to the ordinary work of pathological examinations and research. Naturally much attention was paid to the study of trachoma and to the investigation of the *Bacterium granulosis* of NOGUCHI. So far no proof is forthcoming that this micro-organism has any place in Egyptian trachoma. Spring catarrh is fairly common in Egypt, and it is stated that radium is on the whole more successful than any other form of treatment for this intractable disease. The appendix includes a discussion on the aetiology of trachoma by the Director R. P. WILSON. It is suggested that Noguchi's bacterium may be only pathogenic for the human conjunctiva under certain conditions.

The Eighteenth Annual Report of the Ophthalmic Section of the Egyptian Ministry of the Interior records the statistics of the various institutions in that country devoted to the treatment of eye disease. A study of these statistics reveals many interesting facts. Thus the number of patients treated for chronic glaucoma (6,380) exceeds that of those admitted on account of senile cataract (4,988). Secondary glaucoma admissions amounted to 8,185 patients. 526,406 patients in all were treated during the year. Combined extraction is the routine operation for senile cataract, and Elliot's sclero-corneal trephining that for chronic glaucoma. Snellen's operation is by far the most favoured for the treatment of trichiasis and entropion. It was performed 62,322 times.

H. Kirkpatrick.

²⁶ VOGEL (Hans). Onchocercosis und Augenerkrankungen in Mexiko und Guatemala.—Reprinted from *Med. Welt*. 1931. No. 25. 7 pp.

²⁷ KIRWAN (E. W. O'G.). Syphilitic Diseases of the Eye.—*Indian Med. Gaz.* 1931. Oct. Vol. 66. No. 10. pp. 560-564. With 4 charts in text.

DENGUE.

MURRAY (G. A.). **Dengue Fever.**—*Health*. Canberra. 1931. Nov. Vol. 9. No. 11. pp. 105–111.

It would appear that in Queensland dengue has become endemic in the north, and periodically spreads in epidemic form to invade the southern coastal areas of Queensland and occasionally the north coast section of New South Wales. In 1914 an epidemic of dengue was reported in Darwin, Northern Australia, and again in 1927–28, the infection probably spreading from the north of Western Australia. The author refers to the work of CLELAND and BRADLEY and considers that the provisions of the new dengue convention should be of assistance in the prevention of infection from overseas. *D. Harvey.*

ST. JOHN (Joe H.) & HOLT (Rufus L.). **A Dengue Vaccine prepared from *Macacus philippinensis*.**—*Amer. Jl. Trop. Med.* 1931. Sept. Vol. 11. No. 5. pp. 325–336. With 6 charts in text.

Following on the work of HINDLE in preparing a yellow fever vaccine from the spleen and liver of infected monkeys the authors have attempted to prepare a dengue vaccine on the same lines utilizing *Macacus philippinensis* from a dengue-free area.

These monkeys have been shown to be susceptible to dengue and the virus is present in their blood from the 5th to the 10th day after exposure to bites of infected *Aedes* or injection of blood from human cases. The strain of dengue virus utilized had been obtained originally from a naturally acquired case and had subsequently been employed in experimental work for more than one year. A young monkey was infected by the bites of infective *Aedes*; one week later a batch of clean mosquitoes were fed on this monkey and subsequently shown to be infective by feeding on a susceptible human volunteer. The monkey was then killed and the spleen and liver removed, cut into small pieces and ground up with sand in a sterile mortar and mixed with 13 cc. of 9.0 per cent. saline solution. On the following day 117 cc. of sterile distilled water was added, thus suddenly bringing the strength of the solution to 0.9 per cent., the idea being that the sudden change in the osmotic pressure would cause the rupture of the tissue cells; carbolic acid was then added sufficient to give a 0.5 per cent. strength and the vaccine was stored in the ice box. 30 cc. of the clear amber coloured supernatant liquid was taken and was tested for sterility in a variety of ways and by animal injection. Five volunteers each received one cc. of the vaccine; no reaction was noted. A week later two of these volunteers received a second dose of the vaccine and ten days later mosquitoes, known to be infective, were fed on them; both developed typical attacks of dengue. The experiment was repeated with vaccine prepared from a second monkey and the 3 volunteers of Exp. 1 who had not been tested were reinoculated on two occasions with the new vaccine and then exposed to the bites of infective mosquitoes; one of these men developed dengue within 24 hours, one did not develop dengue and one had a typical attack after an incubation period of 6 days. Volunteer No. 1 had probably contracted dengue in the ordinary way and it was discovered later that No. 2 had been in hospital for two days with fever and was therefore immune.

Conclusions :—The dengue vaccine prepared from the liver and spleen of infected monkeys did not protect volunteers from an attack of dengue but there was evidence that the attacks in the inoculated were very mild. It was shown that *Aedes* can be infected by feeding on monkeys during the period when the virus is present in the blood.

D. H.

NOMURA (S.) & AKASHI (K.). Ueber Todesfälle infolge von Haemorrhagie im Verlauf des Denguefiebers. [**Death from Haemorrhage in Dengue.**] —*Taiwan Igakkaï Zasshi* (*Jl. Med. Assoc. Formosa*). 1931. Oct. Vol. 30. No. 10 (319). [In Japanese. German summary p. 84.] [Govt. Hosp., Tainan, Formosa.]

Five fatal cases of dengue are recorded in children aged 4 to 10 years. Death was due in all to severe haemorrhage from the bowel with vomiting of blood. [No further account of the disease is given in the German summary.]

D. H.

SYSSINE (A.). Les mesures contre la dengue en U.R.S.S.—*Bull. Office Internat. d'Hyg. Publique*. 1931. Sept. Vol. 23. No. 9. pp. 1624-1626.

DE VRIES (D.). Het bloedbeeld bij knokkelkoorts.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1931. Nov. 15. Vol. 71. No. 16. pp. 1358-1360. With 3 text figs.

TYPHUS AND UNCLASSED FEVERS.

MORRIS (E. Sydney). **The Incidence of Endemic Typhus (Brill's Disease) in New South Wales.**—*Rep. Director-General of Public Health, New South Wales, Year 1930.* pp. 47–51. With 2 charts and 1 plan.

During the past three years, 1928–1930, there have been seven cases of endemic typhus (Brill's disease) reported in New South Wales. Brief summaries of these cases are given. The Weil-Felix reaction was positive in all. Five out of the seven were in males. There was a history of the prevalence of rats in two. *D. Harvey.*

MCGILLIVRAY (W. S.). **Brill's Disease or Pseudo-Typhus.**—*Med. Jl. Australia.* 1931. Dec. 5. 18th Year. Vol. 2. No. 23. pp. 716–719. With 1 chart in text.

The author refers to the discovery of pseudo-typhus or Brill's disease in Australia. He made blood cultures from some of these cases but although on one occasion he isolated a *Bact. faecalis-alkaligenes* nothing else of interest was found. However, from the sputum of one case he isolated a bacillus which when inoculated into rabbits produced a serum which agglutinated *Proteus vulgaris* X₁₉ Warsaw in a dilution of 1/300. *D. H.*

EMANUELS (B. J.). Enkele onderzoeken over tropical typhus en (of) mijtekoorts in Atjeh. [**Research on Tropical Typhus and (or) Mite Fever in Atjeh.**].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Feb. 15. Vol. 72. No. 4. pp. 196–205. With 4 charts in text and 2 figs. on 1 plate.

Between March and July 1931 there were 35 cases of clinical tropical typhus among members of military patrols in N. Atjeh. 12 of these cases are quoted in some detail; 4 of them showed an ulcer as a primary sore, and might therefore be classified as mite fever (previously known as pseudo-typhus SCHÜFFNER). Serologically (agglutination of *Proteus* Kingsbury) all the cases were positive. Out of 3 cases in which inoculation in guineapigs was attempted one gave a typical positive result.

The author holds that tropical typhus and mite fever are identical, the only difference being that in the latter the special character of the bite of the transmitting *Trombiculus* (greater depth?) causes the ulcer known as the primary sore. *W. J. Bais.*

TAGAMI (Y.). **The Resemblance of the So-called Typhus Manchuricus to the Mexican Typhus reported by Dr. Moaser [Mooser] and also to the Brill's Disease by its Clinical Symptoms: Further on the Rickettsia Body in the Cells of the Tunica Vaginalis Testis.**—*Sei-I-Kwai Med. Jl.* 1931. June. Vol. 50. No. 6 (544). pp. 1–3.

Typhus Manchuricus is a mild form of typhus similar to Brill's disease. The Weil-Felix reaction is positive; the disease can be transmitted to guineapigs and monkeys and in the former animal gives a reaction similar to that of Mexican typhus and the Rickettsia bodies are readily demonstrated in the tunica vaginalis. *D. H.*

DYER (R. E.), RUMREICH (A. S.) & BADGER (L. F.) **The Typhus-Rocky Mountain Spotted Fever Group in the United States.**—*Jl. Amer. Med. Assoc.* 1931. Aug. 29. Vol. 97. No. 9. pp. 589-594. With 3 charts. [30 refs.]

This paper is based largely on work already published by the authors in the *Public Health Reports*. The first section is mainly historical and refers to the discovery by BRILL (1910) in America of the fever now described by his name.

It has now been established that there are two typhus-like diseases in the eastern states of North America: endemic typhus (Brill's disease) and spotted fever, identical with Rocky Mountain spotted fever of the western States. The differential diagnosis from the clinical picture is given; two points being the difference in the type and distribution of the rash and the fact that mortality in the spotted fever cases is 20 per cent. whereas in the endemic typhus cases it is nil. Two strains of the eastern spotted fever virus were isolated and shown to be identical with the virus of the State of Montana (Rocky Mountain), but distinct from that of endemic typhus. Laboratory investigations have also clearly proved that the vector of the eastern spotted fever virus is the dog tick *Dermacentor variabilis* and the virus has been passed through several of the stages of development of the tick. Infection to human beings can be carried either by the bite of the larvae or adults or by crushing of infected ticks removed from dogs.

It has been suspected for some time that the vector of endemic typhus was a parasite of the rat, and the authors have isolated from rat fleas (*X. cheopis*) the virus of the disease and have produced in guinea-pigs the typical reactions, and have shown by crossed immunity experiments that this virus is identical with the virus of endemic typhus (human strain), and also with the virus of epidemic typhus, but differs from that of spotted fever either of eastern or western origin.

D. H.

NICOLLE (Charles). Sur l'intérêt d'une étude expérimentale du virus exanthématique des vallées andines. [**Proposed Study of Typhus Virus in the Andine Valleys.**]—*Arch. Inst. Pasteur de Tunis.* 1931. Dec. Vol. 20. No. 3. pp. 324-327.

The author has recently returned from a visit to Mexico where he has studied the type of typhus fever which occurs there. Clinically it was noted that the disease in Mexico is milder and the rash distinctly more abundant than in Europe. But the most striking difference is in the action of the virus on experimental animals. MOOSER has shown that inoculation of the Mexican virus into guinea-pigs produces a septicaemia with an acute inflammatory reaction of the testicle and tunica vaginalis, with oedema; numerous rickettsias can be demonstrated and the fluid withdrawn is highly infective for other guinea-pigs. On the other hand the Old World virus does not produce this reaction but acts principally on the brain which provides the most highly infective tissue. Also when rats are infected with the Old World virus they show no fever reaction, but inoculation of the Mexican virus into rats produces fever and a severe reaction which is often fatal. It is suggested that the rat may be a carrier of the virus and although not responsible for the epidemic spread, due to lice, may conserve the virus.

The author suggests that his auditors (members of the Société Argentine de Pathologie du Nord) should procure the virus which is known to exist in the Andine valleys and determine if it is of Old World type or corresponds with the Mexican virus of MOOSER. *D. H.*

RAYNAL (J.). Le typhus exanthématique guatémaltèque doit être identifié au typhus exanthématique mexicain. [**Guatemalan Typhus identical with Mexican Typhus.**].—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 49-57. With 6 charts in text.

Typhus in Guatemala resembles tabardillo in its clinical manifestations and is carried by lice. The author has tested the serum of five cases of the local type of fever with four different strains of *Proteus vulgaris* X₁₉. A positive reaction was obtained with all four strains. In the following year 17 more cases were tested and all except one gave a positive Weil-Felix reaction. Inoculation of the blood of these Guatemalan cases into guineapigs produced a mild febrile reaction but a very marked scrotal reaction similar to that obtained in Mexican typhus. *D. H.*

CUSHING (H. B.) & CALDWELL (R. J.). **Sporadic Typhus Fever.**—*Canadian Med. Assoc. Jl.* 1931. Dec. Vol. 25. No. 6. pp. 649-653. With 5 text figs.

This was a fatal case of sporadic typhus occurring in Montreal; typhus or Fränkel's nodules were demonstrated in sections of the skin and Rickettsia bodies in the proliferating endothelial cells. Only 12 cases of typhus have been reported in Montreal in 35 years and these were probably imported; in the case here described the man had lived in Montreal for some years; the authors therefore suggest that the disease may be more common there than is generally supposed. *D. H.*

LILLIE (R. D.). **Pathology of the Eastern Type of Rocky Mountain Spotted Fever.**—*Public Health Rep.* 1931. Nov. 27. Vol. 46. No. 48. pp. 2840-2859. With 29 figs. on 6 plates. [15 refs.]

This account of the pathology of the eastern type of spotted fever is based on post mortem examinations of five cases. The lungs in all were congested and oedematous, exuding pinkish frothy fluid from the bronchi; there was broncho-pneumonia. The liver was not enlarged but the spleen was slightly to moderately so. The brains showed no gross lesions. The testicles were normal in the adult cases.

Microscopic pathology. In all five cases the pia mater showed evidence of dense perivascular lymphocytic infiltration. A similar condition was noted in one case in the choroid plexus, with proliferation of the endothelial lining of capillaries; such lesions were constantly present within the brain substance but were more numerous in the medulla than in the cerebral cortex. These brain lesions fall into 3 classes; (1) those involving vessels and their sheaths; (2) focal proliferative lesions in the brain substance; and (3) focal necroses, these last being dependent apparently on the vascular lesions.

In the liver of one case numerous foci of centrilobular coagulative necrosis were noted; in the kidneys numerous foci of dense lymphocytic, often perivascular, infiltration, with swelling and proliferation

of the endothelium of the capillaries. In the testicles of two cases in young boys haemorrhages and lymphocytic infiltration were marked.

The skin was carefully examined in four cases and in all pericapillary cellular infiltration was noted with endothelial swelling in the capillaries.

D. H.

LABERNADIE (V.). Syndrome exanthématique au cours d'une épidémie de dengue. [**A Typhus-like Fever occurring in a Dengue Epidemic.**—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 7-12. With 1 chart in text.

During an epidemic of dengue in Pondichéry, French India, a case of typhus-like fever was noted. The patient developed a profuse maculopapular rash which extended to the face, palms and soles, with very heavy sweating but no stupor nor typhoid state. Lice were not found on the patient or contacts, but a pet dog of the patient had recently been destroyed owing to tick infestation. The Widal reaction was negative but when the Weil-Felix reaction was performed using 3 strains of *Proteus vulgaris* No. 67, Kasauli and Kingsbury, a strongly positive reaction was obtained with the two first or indologenic strains and a modified reaction with the non-indologenic Kingsbury strain. The author considers that this case was one of pseudotyphus or so-called tropical typhus, probably though not certainly carried by the dog tick, *R. sanguineus*.

D. H.

DYER (R. E.), CEDER (E. T.), RUMREICH (A.) & BADGER (L. F.). **Experimental Transmission of Endemic Typhus Fever of the United States by the Rat Flea (*Xenopsylla cheopis*).**—*Public Health Rep.* 1931. Oct. 9. Vol. 46. No. 41. pp. 2415-2416.

—, —, LILLIE (R. D.), RUMREICH (A.) & BADGER (L. F.). **Typhus Fever. The Experimental Transmission of Endemic Typhus Fever of the United States by the Rat Flea *Xenopsylla cheopis*.**—*Ibid.* Oct. 16. Vol. 46. No. 42. pp. 2481-2499. With 9 charts and 3 figs. on 2 plates. [16 refs.]

The authors point out that the virus of endemic typhus has been obtained from wild rats in areas where this disease is common in man. Endemic typhus is a disease rather of occupation than of domicile and is usually contracted in occupations connected with food distribution and where rats are numerous. A series of experiments is now described which clearly shows that the virus of endemic typhus can be carried from rat to rat by means of the rat flea *Xenopsylla cheopis*.

In the first experiment infected rats were placed in a cage and 50 rat fleas introduced; some of these fleas were later removed and crushed up; stained films showed the presence of Rickettsia, and emulsion of the fleas, injected into guineapigs, produced infection with the endemic typhus virus. In other experiments clean rats were placed in the cage with infected rats and fleas; two weeks later emulsion of the brains of these clean rats when injected into guineapigs produced infection; again when infected fleas were placed on clean rats in separate cages and these rats were killed two weeks later and brain emulsion injected into guineapigs infection with typhus virus was produced. All these strains of virus were carefully controlled by

crossed immunity experiments and by histological examination of the testicles and brains of the infected guineapigs, also by production of agglutinins for X_{19} in the serum of inoculated rabbits. The authors conclude that the evidence produced points to the rat flea (*X. cheopis*) as a common vector of endemic typhus from rat to rat and from rat to man.

D. H.

CEDER (E. T.), DYER (R. E.), RUMREICH (A.) & BADGER (L. F.). **Typhus Fever : Typhus Virus in Faeces of Infected Fleas (*Xenopsylla cheopis*) and Duration of Infectivity of Fleas.**—*Public Health Rep.* 1931. Dec. 25. Vol. 46. No. 52. pp. 3103–3106. With 2 charts in text.

A few fleas were removed from a cage in which were white rats infected with typhus. These fleas were crushed up and inoculated into 2 guineapigs. The typical reaction to typhus virus resulted in both animals. About 50 fleas were collected from the same box and placed in a sterile test tube ; the following morning all the fleas and eggs were carefully removed from the tube and the faeces remaining were emulsified in saline and injected into 2 guineapigs ; both animals reacted and the strain was carried on through four generations. That the strain was true typhus virus was proved by production of agglutinins in rabbits and the demonstration of the typical histopathological changes in the brain of guineapigs and the presence of *Rickettsia* in the tunica vaginalis. The virus in the faeces of the fleas remained viable for at least 36 days, and it appears from further experiment that infection is not due as a rule to the bite of the flea but to the rubbing of infected faeces into wounds in the skin.

D. H.

DYER (R. E.), CEDER (E. T.), WORKMAN (W. G.), RUMREICH (A.) & BADGER (L. F.). **Typhus Fever—Transmission of Endemic Typhus by Rubbing either Crushed Infected Fleas or Infected Flea Faeces into Wounds.**—*Public Health Rep.* 1932. Jan. 15. Vol. 47. No. 3. pp. 131–133.

Fleas fed on infected rats were crushed in a mortar and the proceeds placed on the shaved abdomen of two guineapigs ; the areas were then scarified. Both developed a slight febrile reaction but no scrotal enlargement. However when emulsions of their brains and spleens were inoculated into five guineapigs all developed fever and typical scrotal reaction. The same experiment was repeated, using the faeces of the infected fleas, with a like result ; modified reaction in scarified animals but definite reaction in subinoculated animals. The infection in fleas has now been shown to last as long as 52 days.

D. H.

MONTEIRO (J. Lemos). Typho endemico de S. Paulo. [**Endemic Typhus of S. Paulo.**] I. Formas do typho na America e uma nova infecção observada em S. Paulo. II. Comportamento experimental do virus. III. Comportamento experimental do virus em certos simios ("Macacus," Cebus e Alouatta). IV. Infecção experimental por inoculação do virus na camara anterior do olho. V. Algumas propriedades do virus: filtrabilidade, resistencia á acção da glicerina, ao desseccamento e á congelação.—*Brasil-Medico.* 1931. Nov. 21, 28. Dec. 5, 12 & 19. Vol. 45. Nos. 47, 48, 49, 50 & 51. pp. 1096–1100.

[15 refs.]; 1109-1113. With 23 graphs & 6 figs. in text. [8 refs.]; 1140-1142. With 2 text figs. [2 refs.]; 1163-1165. With 16 graphs. [2 refs.]; 1188-1190. [11 refs.].

- , DA FONSECA (Flavio) & PRADO (Alcides). VI. Pesquisas sobre a possibilidade da transmissão experimental do virus por "Ixodidae," VII. Pesquisa do virus em alguns arthropodos sob condições naturais. VIII. Os ratos como possiveis depositarios do virus na natureza.—*Ibid.* 1932. Jan. 16, Feb. 20 & 27. Vol. 46. Nos. 3, 8 & 9. pp. 49-52. [5 refs.]; 169-172. [10 refs.]; 193-195.

I. American types of the Disease and a New Form seen in S. Paulo — This is the first of a proposed series of articles. The author reviews the subject, describing the classic type, the endemic typhus of N. America, the Mexican (tabardillo), and Rocky Mountain spotted fever. In a section in which the serological reactions are discussed, mention is made of other types, the Australian, Italian, Marseilles fever, *fièvre boutonneuse* of Tunis, the two Malay forms and the tsutsugamushi disease. The S. Paulo type gives a doubtful reaction with *Proteus vulgaris* X₁₉, negative with the Kingsbury strain. As regards the vector experimental transmission has been obtained with certain species of tick, but fleas, bugs, mites are also being investigated. The rat is probably the host.

II. Virus Experiments.—The experiments described in this paper are preceded by remarks on the epidemiology of the disease, based on 44 cases, 15 in 1929, 20 in 1930 and 9 to the end of August 1931. The figures relative to nationality incidence are of no value without a statement of the numbers of each at risk. As regards sex 17 were male, 20 female, 6 not stated; 8 were below 10 years of age, and in succeeding decades 13, 13, 3, and one over 40 years; in 6 there was no record. Six were urban, 33 suburban, 5 rural. 34 died, a 77 per cent. fatality.

For experimental work the primary virus was obtained from a patient in the Isolation hospital; later blood from an infected animal taken at the height of the fever, usually the fourth day. 1-3 cc. was used or 1-2 cc. of a 1 in 10 emulsion of brain in normal saline. 300 guineapigs were employed, and also rabbits, rats (*Epimys norvegicus*) and camondongos. After intraperitoneal injection of the virus fever lasting 4 to 8 days succeeded an incubation period of 3-4 days and death occurred in about 70 per cent. of the guineapigs. 20-25 per cent. of them gave a scrotal reaction, mild or severe. In rabbits similar fever was produced. but the disease did not usually kill [figures are not given]. The rats might give no systemic reaction—*infection inapparente*—but Rickettsia were present in the peritoneal cells. The condition resembled in certain respects tabardillo and Rocky Mountain fever.

III. Experiments with Monkeys.—Seven *Macaca rhesus*, 2 *Cebus apella* and 1 *Alouatta caraya* were inoculated intraperitoneally. The macacus after 2-4 days' incubation reacted with fever lasting as a rule for 4 days and terminating in sudden death. In some there were haemorrhages appearing on the last day or after death. One *Cebus* died like the macaques, the other recovered after fever persisting for 10 days; the *Alouatta* showed, after an incubation of 3 days, fever which ended fatally 3 days later.

IV. Intraocular Inoculation of Virus.—The virus as before, blood or brain emulsion, was inoculated in the anterior chamber of the eye in 13 rabbits, 42 guineapigs and 3 macaques. The dose employed was usually 0.1 cc., rarely 0.2 cc. From the second to the fifth day a local inflammatory reaction was observed together with fever as when the

virus was injected intraperitoneally. The local reaction—conjunctivitis, iritis, and corneal opacity—was much more marked in the guinea-pig; only slight in the monkey, but in either case those animals which recovered were refractory to infection by other routes. The virus could be transmitted in series by intraocular injection of the aqueous humour of an ocularly infected animal.

V. Properties of the Virus.—The author demonstrates some further properties of the virus of the local form of endemic typhus. Whether in the citrated blood or as brain emulsion in saline or glucose broth the virus will not pass through either Chamberland L3 or L5, Mandler or Berkefeld N candles. Mere contact with the conjunctiva does not result in infection although the same virus even up to a dilution between 1 in 10,000 to 1 in 1,000,000 is infective when injected subcutaneously or intraperitoneally. Drying for 24 hours reduces the virulence considerably, but the milder symptoms produced are followed by immunity; after 6 days it is avirulent. Its activity is destroyed after 7 days in pure glycerin, but is retained for over 12 but less than 24 days in 50 per cent. of glycerin. Freezing for 6 weeks does not affect the virulence and this is a good method, therefore, of preserving it in the laboratory.

VI. Experimental Transmission by Ticks. The authors devised series of experiments with *Amblyomma cajennense*, *Argas persicus* and *Ornithodoros rostratus*, to determine their receptivity for the virus, their infectivity by the faeces or by bite, duration of infectivity, hereditary transmission, and the possibility of infection by the coxal fluid. They found that *A. cajennense* becomes infected after feeding on an infected guinea-pig and 13 days later injection of the triturated body of the tick will reconvey the disease to another guinea-pig; that ova from an infected female *Amblyomma* transmits infection to the larvae which will produce in a guinea-pig an immunizing infection inapparente. Only one experiment was made with *A. persicus* and that yielded no result. With *O. rostratus* the results were not constant; in some cases by feeding on an infected guinea-pig they themselves became infected and 13 days later the bite would infect another guinea-pig, but not after 28 days. The coxal fluid contains the virus and can confer immunity when injected. The period of incubation following infection by the bite of the tick was 13 days, considerably longer than that following intraperitoneal inoculation.

VII. Search for Virus in Arthropods.—The authors tested inoculation into guinea-pigs of the head louse, the bed bug, various species of fleas, ticks and mites, with negative results and conclude that "the study of ecto-parasites in infected parts of the town and its environs, of the epidemiology of the disease and the nature of the virus would indicate that the usual transmitter is probably a rat flea in urban areas and an acarus (*Dermanyssidae*) or tick (*Ixodidae*) in suburban and rural districts. The virus may not be exactly the same in the two zones, but further study is needed to test this hypothesis."

VIII.—Rats as Reservoir Hosts.—Rats caught in infected areas were examined and their ectoparasites collected and identified. The animals were then killed, their brains removed aseptically, placed in sterile Petri dishes, emulsified in saline and inoculated into the peritoneum of guinea-pigs. After 20–30 days the latter were tested for immunity by inoculation of 1000 M.I.D. (minimal infecting dose) of the virus. Altogether 124 rats captured in suburban or rural houses where cases had occurred, and 24 from urban houses were examined.

The experiments are not yet concluded but the authors state that so far they have been led to the conclusion that rats may serve as "depositories of the virus," both urban and rural, more particularly the former, but that the virus in the urban is less virulent than that in rural or suburban rats, a possible corroboration of a hypothesis already advanced that there may be two infections or a single virus with two degrees of virulence.

H. H. S.

MARCANDIER & PIROT (Robert). Présence d'un virus, voisin de celui du typhus exanthématique, chez les rats des navires de guerre à Toulon. [**Typhus-like Virus in Rats of Toulon War-ships.**]—*C. R. Acad. Sci.* 1932. Jan. 25. Vol. 194. No. 4. pp. 399-401. With 2 charts in text.

21 rats were captured on board the armed cruiser "Paris" on which ship cases of benign typhus had occurred from time to time. These animals were killed and emulsions of the brain inoculated intraperitoneally into 8 male guineapigs; 5 of these developed fever after an incubation period which varied from 7 to 13 days and periorchitis was noted in all. [A similar reaction to that of the Mexican virus.] The infection was passed on in passage to other guineapigs for several generations; monkeys were inoculated from the guineapigs and these animals also developed fever after an incubation period of 6-7 days. In addition the blood serum of these animals tested after recovery from the fever gave a positive Weil-Felix reaction; in one instance the titre was 1/1700.

D. H.

DOVE (Walter E.) & SHELMIER (Bedford). **Tropical Rat Mites, *Liponyssus bacoti* Hirst, Vectors of Endemic Typhus.**—*Jl. Amer. Med. Assoc.* 1931. Nov. 21. Vol. 97. No. 21. pp. 1506-1510. With 5 text figs.

The strain of virus of endemic typhus utilized in these experiments was obtained from a patient who came under the care of the authors. This man was employed in a café in which rats heavily infested with the tropical rat mite, *Liponyssus bacoti*, were fairly numerous. His blood was inoculated into two male guineapigs which developed the typical reaction of endemic typhus virus with marked scrotal swellings. Guineapigs which had recovered from the fever following inoculation with this local virus were shown to be immune to inoculation with stock typhus fever virus but not to the virus of Rocky Mountain spotted fever.

Rat mites collected from a district where no endemic typhus cases had occurred were shown to be non-infective for guineapigs. Batches of these mites were fed on infected guineapigs and when crushed up and injected into clean guineapigs these animals reacted. In the same way batches of mites fed on infected guineapigs produced infection in clean guineapigs after a period of four days when fed on these animals. The disease was transmitted from guineapig to guineapig by the bites of the tropical rat mite.

There was also evidence of hereditary transmission; larval mites bred from mites which had fed on infected guineapigs proved also to be infective.

In the discussion which followed Dr. MAXCY said he was not satisfied that the authors had successfully infected their guineapigs with typhus virus. Dr. ZINSSER considered that the infection by the mites was a true endemic typhus reaction but that the mite was not the only parasite of the rat which carried the virus from rat to rat or from rat to man; rat fleas and also the bed bug had to be considered.

D. H.

SOUCHARD (L.), MARNEFFE (H.) & LIEOU. Etude expérimentale d'un virus exanthématique isolé d'un cas de typhus, présentant la symptomatologie de la fièvre fluviale du Japon. [**Study of Virus from a Case of Typhus with Symptoms of Japanese River Fever.**]—*Bull. Soc. Path. Exot.* 1931. Oct. 14. Vol. 24. No. 8. pp. 678–708. With 25 text figs. [25 refs.]

The inoculation of this virus, originally obtained from the blood of a case of fever in Indo-China, into guineapigs produced a severe and prolonged fever which in the majority of cases ended fatally. Monkeys, rabbits and rats were also shown to be susceptible but much less so than the guineapig; indeed the disease in rats was “inapparent.” Post mortem examination of guineapigs revealed enlarged spleen and congestion of the suprarenals and lymphatic glands. The intraperitoneal method of inoculation was the most certain but intraocular injection produced a typical local reaction, as also did intradermal injection in monkeys. Examination of these lesions and of smears from spleen and brain revealed Rickettsia-like bodies in considerable numbers. The blood, urine and peritoneal fluid were all found to be infective. The author is of opinion that this was a case not of typhus but of Japanese River fever, the chief point of difference being that in this case the virus produced a severe and often fatal fever in guineapigs, whereas as a rule Japanese River fever virus produces only a mild or inapparent reaction in these animals.

D. H.

SPENCER (R. R.). **Expansion of Investigations on Tickborne Diseases by the United States Public Health Service.**—*Public Health Rep.* 1931. Sept. 4. Vol. 46. No. 36. pp. 2097–2101.

As a result of the investigation of Rocky Mountain fever by the Public Health Service, it has been proved that ticks are also carriers of tularaemia. Experimentally the tick has been shown to be infective for many months and to transmit the infection through the eggs to the second generation. Previously these cases in man following tick bite had been diagnosed as tick fever without rash.

As regards prevention of Rocky Mountain fever, progress has been slow but the author and his colleagues are very hopeful that in a vaccine prepared by themselves they have a most effective weapon, and large numbers of people have already been inoculated. The Montana State Legislature have provided funds for the construction of a laboratory to prepare the vaccine; one part of the building being devoted to the rearing of infected ticks on a large scale, 200,000 in a year, from which the vaccine is prepared. In the new building research is also to be carried on, including investigation of Colorado tick fever which differs from spotted fever in that it is rarely fatal, produces no rash and the serum of cases does not give a positive Weil-Felix reaction.

It is of interest to note that a single species of the western tick, *Dermacentor andersoni*, transmits to man by its bite no less than four diseases, namely Rocky Mountain spotted fever, tularaemia, tick paralysis and Colorado tick fever. D. H.

TROUP (J. McDonald) & PIJPER (Adrianus). **Tick-Bite Fever in Southern Africa.**—*Lancet*. 1931. Nov. 28. pp. 1183–1186. With 2 charts in text. [17 refs.]

Tick-bite fever of Southern Africa is a definite clinical entity which belongs to the typhus-like diseases that have been described recently in various parts of the world. The disease is similar to typhus but there are various points of difference clinical, pathological and serological.

The bite mark of tick-bite fever is the most characteristic sign; this is a small necrotic sore (the tache noire of Marseilles fever) and is invariably accompanied by painful enlargement of the lymph glands draining the area; such a lesion is of course not found in true typhus. The serum of patients agglutinated the 3 strains of *Proteus* employed, X_2 , X_{19} and Kingsbury strain, in low dilutions during the course of the fever but in increasing titre during convalescence. On the other hand the serum of South African typhus cases agglutinates X_2 and X_{19} in high dilutions during the fever and the Kingsbury strain not at all. In tick bite fever there is a marked lymphocytosis whereas in typhus the neutrophile cells are increased. The disease is apparently carried by the larval stage of the tick and not by the adult, in most cases *Amblyomma hebraeum*, occasionally *Rhipicephalus*. D. H.

PIJPER (Adrianus) & DAU (Helen). **An Agglutination-Curve in Tick-Bite Fever.**—*Jl. Med. Assoc. South Africa*. 1931. Aug. 22. Vol. 5. No. 16. pp. 519–521. With 2 text figs.

A volunteer allowed herself to be bitten by larval ticks collected in a district where tick fever was known to be prevalent. The subject was kept under close observation from the time of the bite and throughout the fever which duly followed; the idea being to record carefully the agglutination reactions with various strains of *Proteus vulgaris*. The clinical course was also carefully observed; fever began on the 10th day and to the satisfaction of the observers (if not the victim) proved severe with intense headache and papular rash. 21 samples of blood were collected from the patient before, during and after the illness and kept in the ice chest, and were tested out against the different strains of *Proteus* on the same day. Living emulsions from agar cultures of *P. vulgaris* X_{19} , *P. vulgaris* (Kingsbury) and *P. vulgaris* X_2 were employed. The titre for all three commenced to rise during the incubation period and reached 1/100 at the beginning of the fever; the peak of the curve was reached on the 22nd day although the fever ceased on the 19th day reckoned from the date of the bite.

The titre for Kingsbury strain was much higher, 1/400, than that for the other two strains, 1/100. This has not been the experience of the authors in all cases as in some instances the titre for all three strains has been the same. In the present case there was a secondary rise in agglutination titre from the 35th to the 50th day. D. H.

FINDLAY (G. M.). **Rift Valley Fever or Enzootic Hepatitis.**—*Trans. Roy. Soc. Trop. Med. & Hyg* 1932. Jan. 30. Vol. 25. No. 4. pp. 229–262. With 9 text figs. & 6 plates (1 coloured).

— & DAUBNEY (R.). **The Virus of Rift Valley Fever or Enzootic Hepatitis.**—*Lancet*. 1931. Dec. 19. pp. 1350–1351.

This disease was first described by DAUBNEY in East Africa in 1931. In 1912 there was a heavy mortality in lambs in Naivasha which was almost certainly due to the same disease. No human cases were recorded at that time. A similar epidemic occurred among sheep and lambs in 1930 in the Rift Valley. Infected blood was brought home and inoculated into two lambs; both died within 36 hours. Two of the investigators who did the post mortem on these animals became infected with the virus. Mice, rats and monkeys were shown to be susceptible.

Clinical symptoms in man.—The incubation period varied from 5 to 6 days. The fever was ushered in by headache and pain in the back, shivering and malaise. Conjunctivae were not injected. In one case on the fourth day the temperature fell to normal with profuse sweating; this patient had, however, been given an injection of 10 cc. of immune human serum. No rash was ever observed, and blood cultures were sterile but the blood was highly infective for mice when taken during the fever. In two other cases although the temperature dropped to normal on the 4th day there was a recurrence of fever on the 6th day recalling the saddle back temperature curve of dengue; in another case the fever lasted ten days and convalescence was prolonged. Immunity can be produced by injection of serum of persons who have recently recovered from the disease. In this paper the author gives a full account of the effect of inoculation of the virus into experimental animals and of the post mortem appearances. *D. H.*

i. BROOM (J. C.) & FINDLAY (G. M.). **Complement Fixation in Rift Valley Fever.**—*Lancet*. 1932. Mar. 19. pp. 609–611.

ii. DAUBNEY (R.) & HUDSON (J. R.). **Rift Valley Fever.**—*Ibid.* pp. 611–612. [Summary appears also in *Bulletin of Hygiene*.]

i. Not the least important point connected with Rift valley fever, the aetiology of which was discovered by Daubney, Hudson and GARNHAM, is that the virus is pathogenic for man. The resemblance between the clinical characters of this disease and those of dengue, sandfly fever and yellow fever accentuates the need for accurate diagnosis.

The presence of complement-fixing antibodies can be demonstrated in the blood of infected people and animals. The antigen used in the tests was a 2 per cent. extract of liver of rats and mice dying of the disease. The saline extract was centrifuged and filtered through paper. Chamberland filters appeared to reduce the antigenic value. As far as has been ascertained the complement fixation is specific for Rift valley fever. Control sera from syphilitics, cases of recovered dengue and yellow fever gave no fixation; the antibody persists for at least 6 months after infection.

In one case in a human being and in one monkey fixation occurred when there had been no evidence of infection clinically. The human being had been exposed to infection.

Two sheep sera have been tested. That from a ewe still gave positive reactions three months after infection, but that from a lamb while positive at 14 days was negative at three months.

The antigen seems to disappear from the sera of infected rats and mice more rapidly than from other species of animal. Two to three weeks appears to be about the limit of its persistence. A few experiments show that liver dried over phosphorous pentoxide can be used for the preparation of antigen.

ii. In this paper Daubney and Hudson confirm the susceptibility of certain African rodents to experimental infection, but they do not appear to have been able to produce any evidence of natural infection among them.

While it has been proved that the virus can survive in engorged nymphs of *Rhipicephalus appendiculatus* the adults failed to prove infective.

A. Leslie Sheather.

TORPY (C. D.). **An Investigation of the Short Fevers at Trimulgherry, 1931.**—*Indian Med. Gaz.* 1931. Oct. Vol. 66. No. 10. pp. 564–567. With 7 charts in text.

These short fevers occur every year in the station and usually just after the outbreak of the monsoon, reaching their maximum about the middle of June, and are coincident with the appearance of the sand flies *P. papatasi* and *P. minutus* and also various mosquitoes, notably *Aedes argenteus*. In 1931, 39 cases occurred among the British troops and none among the Indians; 22 were in the cavalry and the men who slept in the upper stories of the barracks as a rule escaped. Clinically cases were divided into 2 types: (1) a simple fever lasting 3 to 4 days, and (2) cases with a recurrence of fever on or about the 7th day; otherwise the two types were similar—flushed face, injected conjunctiva (pink eye), no joint pains and no rash. All were diagnosed “sand fly” fever. One suggestion is that the vector of the simple type is *P. papatasi* and of the recurrent type *Aedes argenteus*; or that the relapsing type is a form of dengue.

D. H.

i. PIERAERTS (Georges) Notes cliniques sur la “fièvre rouge congolaise.” [**Notes on Red Congolese Fever.**—*Ann. Soc. Belge de Méd Trop.* 1931. June 31. Vol. 11. No. 2. pp. 189–204.

ii. —. La fièvre rouge congolaise est-elle la dengue? [**Is Red Fever Dengue?**—*Ibid.* Aug. 31. No. 3. pp. 321–341. [54 refs.]

i. The author refers to papers by LEFROU and LEGENDRE, summarized in this *Bulletin* (Vol. 25, p. 529). He adopts the name given by LEFROU and considers the fever to be a separate entity and not abortive dengue. He observed at least 20 cases in Leopoldville and considers that the disease is infectious and spread from case to case. He gives a careful description of the clinical symptoms; briefly it is a short fever, 3 to 4 days, with sudden onset characterized by a rash (papulo-macular) which appears on the second day, enlargement of the lymphatic glands with the exception of the inguinal group, and lymphocytosis.

ii. Clinically there are no marked differences between red fever and dengue. Unlike dengue, red fever has no tendency to epidemic spread. Transmission by *Aedes* or by sand flies has not been demonstrated.

D. H.

MARMO (A.). **Observations on *Bacillus columbensis* Fever (Castellani's Fever). With Report of Six Cases occurring in Eritrea.**—*Jl. Trop. Med. & Hyg.* 1932. Jan. 15. Vol. 35. No. 2. pp. 20-24. With 6 figs.

This fever was first described by CASTELLANI in Ceylon (1905) and the associated bacillus called *B. columbensis*. There are two types of fever, one similar to the usual typhoid fever curve and the other a prolonged fever with numerous relapses, which may last in all about six months. The author describes six cases met with in his practice. Blood culture and agglutination tests were negative for the typhoid paratyphoid group, but *B. columbensis* was isolated from the faeces in 4 of the cases and the serum of all agglutinated this bacillus (1/400 in 4 instances).

D. II.

COMBIESCO (D.) & ZOTTA (G.). **Présence de la fièvre exanthématique de Marseille à Constantza (Roumanie). Observations cliniques et expérimentales sur le rôle de *Rhipicephalus sanguineus* dans la transmission. [Eruptive Fever at Constantza: Transmission by Tick.]**—*C. R. Soc. Biol.* 1931. Vol. 108. No. 38. pp. 1279-1280.

Eruptive fever has now been discovered in Constantza, the Rumanian port on the Black Sea; 32 cases were reported during the hot weather in 1931. In one case a tick (*R. sanguineus*) was removed from a child's abdomen at the beginning of an attack of fever; the tache noire developed at the site of the bite and the child passed through a typical attack. The dogs in the city are heavily infested with ticks; ten of these ticks were taken, ground up and emulsified and injected into two volunteers; both men after an incubation period of 5 days developed typical attacks of fever.

D. H.

REGENDANZ (P.). **Das exanthematische Zeckenfieber. [Eruptive Tick Fever.]**—*Dermat. Woch.* 1931. Nov. 14. Vol. 93. No. 46. pp. 1765-1769. [15 refs.]

The author refers to Marseilles fever and Tunisian "fièvre bouton-neuse" under the name tick fever and gives a detailed description of the rash and clinical symptoms. He divides the fever into 3 periods: 1. A period of 3-5 days with fever, headache and pains in back and limbs. 2. A period of 8 days with fever and rash. 3. A period of recovery without fever but during which the rash persists. He then refers to the discovery of ticks and tick bites on patients and to the work of DURAND and CONSEIL and BRUMPT on the transmission of the disease by means of the dog tick *R. sanguineus*.

D. H.

LEMAIRE. **La maladie de Conr et Bruch. [Disease of Conr and Bruch.]**—*Rev. Méd. et Hyg. Trop.* 1931. Nov.-Dec. Vol. 23. No. 6. pp. 289-291.

The author after discussing the various names which have been given to "exanthematous fever" of Marseilles suggests that it should receive the name "the fever of Conr and Bruch" in honour of the two workers who first described it in Tunis in 1910. M. BROQUET who

spoke in the discussion did not agree; he considered that the two names "exanthematous fever" and "fièvre boutonneuse" should stand until a more definite agreement had been reached as to the etiology and serology. *D. H.*

COMBIESCO (D.). Sur la nature de la "tache noire" décrite dans la fièvre exanthématique de Marseille. [**The Tache noire of Eruptive Fever.**—*C. R. Soc. Biol.* 1931. Vol. 108. No. 38. pp. 1281-1282.]

The author has noted that intradermal injection of infective blood from cases of fever produces at the site of injection a typical tache noire or primary ulcer; whereas the injection of the same blood subcutaneously or intramuscularly produces no such reaction though infection follows. He suggests that the tache noire is due to a local multiplication of virus with secondary inflammation due to bacteria and possibly a toxic substance injected by the tick. *D. H.*

DES ESSARTS (J. Quérangal) & PRADÉ (J. V.). Un cas de fièvre exanthématique, observé à Brest. [**Case of Eruptive Fever seen at Brest.**—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 109-113.]

The patient had recently arrived in his ship which had been stationed at Toulon. The case was a mild one but with profuse rash in which some of the elements were distinctly petechial. The Weil-Felix reaction was strongly positive on the 12th day of the disease in dilution 1/1250 and in convalescence at 1/12,400. No lice were present on the patient nor on any of the sailors but rats were very numerous on board and the rat louse and rat flea were found on captured rats. *D. H.*

COMBIESCO (D.). Exaltation de la virulence du virus de la fièvre exanthématique de Marseille par mélange de plusieurs souches. [**Exaltation of Virulence of Eruptive Fever by Mixture of Strains.**—*C. R. Soc. Biol.* 1931. Vol. 108. No. 38. pp. 1282-1284. [2 refs.]]

It has already been shown that the virus of eruptive fever rapidly loses virulence when passaged from man to man or from monkey to monkey and soon produces no reaction at all or only a mild and a typical one. The author has shown, however, that if blood from two or three cases of fever is mixed together and injected into a human subject a very severe type of fever is produced. This procedure enables the virus to be used for pyrexial treatment of nervous diseases. *D. H.*

OLMER (D.) & OLMER (Jean). Nouvelles recherches sur la fièvre exanthématique provoquée. [**Experimental Eruptive Fever.**—*Bull. Acad. Méd.* 1931. Nov. 17. Year 95. 3rd Ser. Vol. 106. No. 36. pp. 348-353.]

The authors inoculated two subjects with an emulsion of crushed up ticks on 28th July; both men developed fever, one on the 6th, the other on the 5th day. From these men 20 cc. of blood was taken every 24 hours and inoculated into volunteers up to the number of 14.

The men who were inoculated during the incubation period did not develop fever but the man inoculated with blood taken on August 2nd, the first day of fever, duly developed the disease after 15 days incubation; the fever in his case lasted 11 days with a profuse eruption; also the man inoculated with blood taken on the 11th August, the last day of the fever, duly developed the disease as did those inoculated with blood taken between these two periods. These people were shown to be immune to later injections of infective blood and it was also shown that the blood of convalescents had protective powers. *D. H.*

DURAND (P.) & LAIGRET (J.). Réceptivité du rat blanc et de la gerbille au virus de la fièvre boutonneuse. [**White Rat and Gerbille Receptive to Virus of Eruptive Fever.**]-*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 106-109.

With a view to preserving the virus of eruptive fever in the laboratory the authors inoculated a number of the local rodents. In two instances the white rat and the gerbille became infected by injection of blood from a case of fever. The infection was, however, inapparent. The animals were killed on the 12th day after inoculation and emulsion of the brain inoculated into susceptible volunteers produced a typical attack of fever. *D. H.*

TROISIER (Jean) & CATTAN (Roger) in collaboration with SIFFERLEN Fièvre exanthématique inapparente de l'homme transmise par *Rhipicephalus sanguineus*, virulence pour le singe et le cobaye. [**Inapparent Eruptive Fever of Man transmitted by *R. sanguineus*.**]-*Ann. Inst. Pasteur.* 1931. Nov. Vol. 47. No. 5. pp. 492-507. With 6 text figs.

The authors collected a number of ticks (*Rhipicephalus sanguineus*) from healthy dogs in the district of the Var, where no cases of fever had been reported and at a season of the year, spring, when fever does not occur. 60 of these ticks were ground up with sterile sand in saline solution: the mixture was centrifuged and the supernatant fluid injected into a patient with nervous disease. The patient's temperature was carefully recorded for over three months but continued normal throughout and the man showed no effects whatever following the inoculation. However it was found that his blood serum, which was tested before the inoculation with negative results and was also negative on the 4th day after the inoculation, gave a positive Weil-Felix reaction on the 14th day; 5 days later the reaction was positive in a titre of 1/250; six weeks after inoculation it was faintly positive in 1/50 but again rose to 1/250 3 months after inoculation. A monkey inoculated with blood from this man developed fever lasting about 10 days after 10 days' incubation; the serum showed a positive Weil-Felix reaction and an eruption consisting of purple spots developed on the eyelids of the monkey; obviously the blood of this man was infective for the monkey. Blood from the patient when inoculated into guineapigs produced a febrile reaction and this infection was passed on in series to several guineapigs, thus resembling the typhus virus in its infectivity for this animal.

One of the cutaneous lesions (purple spots) was removed from the eyelid of the monkey and sectioned; it showed swelling and proliferation of the endothelial cells of the capillaries with perivascular infiltration, "cuffing," of these small blood vessels, a condition comparable to that found in the skin lesions in human cases. *D. H.*

BLANC (Georges) & CAMINOPETROS (J.). L'immunité dans la fièvre boutonneuse, la non virulence du sang des anciens malades et l'absence de pouvoir préventif de leur sérum. [**Immunity in Fièvre boutonneuse.**]—*C. R. Soc. Biol.* 1931. Dec. 4. Vol. 108. No. 35. pp. 853-854. [Pasteur Inst., Athens.]

Three volunteers, who had been inoculated in March 1931, one with emulsion of crushed infective ticks and two with virulent blood from cases of eruptive fever and who all had typical attacks of fever, were reinoculated in May, i.e. two months later; all three proved to be immune whereas a fourth volunteer inoculated at the same time with the same dose developed a typical attack of eruptive fever (fièvre boutonneuse). This experiment was repeated; 5 people recently recovered from the fever were reinoculated with the test dose; all proved immune; a control contracted the disease. 40 cc. of blood taken from people recently recovered from fever was inoculated into a susceptible volunteer; no infection resulted. Four volunteers were inoculated, two with 25 cc. of virulent blood and two with a mixture of virulent blood mixed with serum from two recovered cases; all four developed typical attacks of fever; apparently the serum of men recovered from the disease has no protective power. *D. H.*

BECKER (Frederick E.). Tick-borne Infections in Colorado. I. The Diagnosis and Management of Infections transmitted by the Wood Tick. II. A Survey of the Occurrence of Infections transmitted by the Wood Tick.—*Colorado Med.* 1930. Feb. & Mar. Vol. 27. Nos. 2 & 3. pp. 36-43; 87-95. With 4 figs. & 6 charts. [18 refs.] [Med. School, Univ. of Colorado, Denver.]

BONGIOVANNI (Vincenzo). Sulla febbre esantematica del Mediterraneo.—Reprinted from *Studium*. 1931. Vol. 21. No. 10. 12 pp. With 2 text figs. [41 refs.] [Inst. of Clin. Med., Univ., Catania.]

ERRATUM.

Vol. 29, No. 1, p. 19.

LINDBERG. Un cas de fièvre exanthématique observé dans l'Inde Britannique.—The English equivalent given was—Case of Typhus seen in British India.

As Dr. LINDBERG points out the translation should have been—Case of Eruptive Fever seen in British India.

UNDULANT FEVER.

TUNISIE MÉDICALE. 1931. Nov. Vol. 25. No. 9. pp. 459-550.

With 14 charts & 3 figs. on 1 plate. [15 refs.]—Numéro consacré à la fièvre Méditerranéenne. [**Undulant Fever Number.**]

The Medical Society of Tunis recently discussed the differential diagnosis between undulant fever and tuberculosis and the discussion is summarized in this number of their journal. It is noted that the two diseases may develop simultaneously but it was generally agreed that undulant fever has no influence good or bad on the development of tubercular disease. Mention was also made of cases of undulant fever with definite pulmonary symptoms simulating phthisis but which cleared up entirely when the fever ceased; the cases which had most often given rise to errors in diagnosis were the early stages of tubercular disease (septicaemia) which ended in local tubercular lesions. It was, however, agreed that X-ray examination of the chest was of the greatest assistance in the differential diagnosis and that serological tests, blood cultures and Burnet's melitine tests should also be employed.

Articles follow dealing with undulant fever from the clinical, bacteriological and therapeutic aspects. Among those cases described are cases of meningitis, optic neuritis with sudden blindness, and spinal lesions occurring during the course of the disease. The case of myelitis was treated by intrathecal injection of melitine and made a good recovery as did the other cases when the fever ceased. One lengthy paper by NALLI of the Italian Hospital in Tunis deals with the treatment of undulant fever by means of "cutivaccination" (intra-dermal injections of small doses, 10 to 12 million, of killed cocci); the author claims that by this method a severe case of indeterminate length can be transformed into a mild case in which the fever will cease after a short period, 10 days or so. Two cases of undulant fever are described in which the first "waves" of fever, which lasted about three weeks, displayed all the symptoms of typhoid whereas the subsequent waves were frankly undulant fever, a diagnosis confirmed by the agglutination reaction. Two other articles follow dealing with the treatment of undulant fever by tripaflavine and by injections of melitine.

D. Harvey.

MARSEILLE-MÉDICAL. 1931. Dec. 5. Vol. 68. No. 34. pp. 693-754. [14 refs.]—Numéro consacré à la neuromélitococcie par le professeur Henri ROGER. [**Nerve Complications of Undulant Fever.**]

This number of *Marseille-Médical* consists of four articles by Professor Henri Roger, professor of the Neurological Clinic in Marseilles, dealing with the nervous complications in undulant fever. The first article describes the mental complications with illustrative cases, the second the meningeal complications and the third deals with cases of spasm of the cerebral blood vessels due to the action of the *Br. melitensis*. The fourth article describes some interesting cases in which meningeal symptoms developed 3 or 4 years after an attack of undulant fever.

D. H.

JEWELL (N. P.). **Undulant Fever due to *Brucella abortus* in Kenya Colony.** With Report by W. B. C. BANKS.—*Jl. Trop. Med. & Hyg.* 1931. Aug. 15. Vol. 34. No. 16. pp. 261–263. With 3 charts.

This is a record of the first case bacteriologically proven of abortus infection in man in Kenya colony. The patient had in the course of his work attended to a cow, which had aborted, just three weeks before his fever started. The *Brucella abortus* was isolated from the blood, increased concentration of CO₂ being employed for the initial cultures; blackening of lead acetate cotton wool was noted. The serum of the patient agglutinated a strain of *Br. abortus* to a titre of 1/400. The serum of a cow infected with abortus agglutinated the strain isolated from the patient and a known strain to the same titre. In other particulars the strain isolated was typical. D. H.

MALARIA.

LEAGUE OF NATIONS. HEALTH ORGANISATION. **Conclusions of the Sub-Committee of Experts on Quinetum.** C.H./Malaria/167.—
2 mimeographed pp. 1931. May 6. Geneva.

The Conclusions of the Sub-Committee of Experts of the Health Organization of the League of Nations are of general interest and are therefore published *in extenso*.

" 1. The name 'Quinetum' should be reserved for a preparation consisting of quinine, cinchonidine and cinchonine in equal parts, that being approximately the normal proportion of these alkaloids in *Cinchona succirubra*.

" 2. A new standard preparation 'total alkaloids of cinchona' which we propose to name 'Totaquina' should be recommended for the treatment of malarial populations. This preparation should contain at least 70 per cent. of crystalline alkaloids, of which not less than 15 per cent. must be quinine. Amorphous alkaloids should not exceed 20 per cent, mineral matter not more than 5 per cent. and water not more than 5 per cent.

" 3. The Sub-Committee of Experts propose that the Malaria Commission of the League of Nations should bring the new standard preparation (Totaquina) to the notice of the interested Governments with a view to the adoption of the formula in the National Pharmacopœias. The Commissions of the National Pharmacopœias would prescribe the tests necessary for analytical control of the product.

" 4. In countries where cinchona febrifuge is at present manufactured or used, the competent authority should bring, by addition of crystalline or crystallisable alkaloids, the product as now manufactured to the Totaquina standard.

" 5. In the malarial tropical countries where the cost of imported drugs may prohibit their use, Governments should examine the expediency of cultivating *Cinchona* species for local use as total alkaloids of *Cinchona* 'Totaquina' or for chemical or galenical preparations of the bark. Before undertaking such cultivation, however, careful preliminary enquiries into local conditions should be made with the assistance of medical, botanical, chemical and agricultural experts.

" 6. According to the information forwarded by Prof. Zünz and from the experience of those who have lived in Africa, it is well known that natives accept and even seek vegetable drugs found on their own soil in preference to imported remedies. In view of this attitude it would be desirable to place at the disposal of African Colonies the results of the experiments in *Cinchona* cultivation made in British East Africa and in the Belgian Congo and to communicate to the Governments the knowledge acquired both as to the species to be selected and as to the agricultural conditions required."

SPRUE.

BEIJNEN (G. J. W. Koolemans). Autochthone tropische spruw in Nederland. [**Autochthonous Tropical Sprue in Holland.**].—*Nederl. Tijdschr. v. Geneesk.* 1931. Dec. 12. 75th Year. No. 50. pp. 5978-5985.

In this clinical lecture two cases of typical sprue were presented and discussed. Neither of the women had ever been in the tropics. The chief symptoms were the characteristic tongue or glossitis, meteorism, intermittent painless diarrhoea, steatorrhea, light grey stools containing fat-soaps and fatty acids, emaciation. In one of these cases anaemia was slight and achlorhydria absent; in the other anemia was more severe and achlorhydria definite. The diagnosis lay between an affection of the pancreas, pernicious anaemia and tropical sprue. No local symptoms pointed to pancreas, while the mouth and gastric symptoms were also not in favour of a pancreatic causation. Emaciation is not a symptom of pernicious anaemia, but is very regular in sprue. On the other hand achlorhydria is practically invariable in pernicious anaemia and may or may not be present in sprue. The blood picture though very similar in both diseases is less marked in sprue. Most of the interest of these cases centres in their occurrence in a temperate climate. Other cases have been reported and the author considers that they may be commoner than has been suspected; he also inclines to the view that the "coeliac disease" of children is to be identified with sprue.

W. F. Harvey.

- i. SUÁREZ (Jenaro). **Pernicious Anemia and Sprue.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Dec. Vol. 7. No. 2. pp. 145-165. [16 refs.]
- ii. ASHFORD (Bailey K.) & PONS (Juan A.). **A Clinical Investigation of Thirteen Cases of Anemia of Pernicious Type in Porto Rico.**—*Ibid.* pp. 167-201. With 7 charts. [29 refs.]

i. Fifty cases of early sprue and twenty advanced cachectic cases during the past 6 years have been selected and compared as regards the blood status with CABOT'S series of 1200. The author concludes that at present the evidence is not sufficient for a definite decision as regards the identity of pernicious anaemia and sprue but he obviously believes in this identity, as may be inferred from the following quotation: "This finding [of Monilia psilosis in both] is in favour of a common identity [sic] of the two conditions. In pernicious anemia the achylia gastrica and the cord symptoms occur early. . . . In sprue the achylia gastrica and the cord changes occur late in the course of the disease. Should these differences be considered so important as to justify the belief that the two diseases are different entities?"

ii. The authors record details of 13 cases of anaemia of pernicious type, 12 of them in the cachectic stage of sprue. In addition to the blood changes, charts illustrative of them, figures from analyses of the gastric and, in some cases, duodenal contents are also given, together with clinical details and the findings on physical examination. The authors refer to the previous paper but have arrived at a different conclusion saying: "The fact of the matter is, we have reached the point where we must see that sprue and Addison's disease are two separate diseases

with a common haematologic phenomenon, a macrocytic anemia." Those interested must consult the original, since comparison of the details shows too great variations between the individual cases to permit of a summary. *H. H. S.*

FAIRLEY (N. Hamilton) & KILNER (T. Pomfret). **Gastro-Jejuno-Colic Fistula, with Megalocytic Anaemia simulating Sprue.**—*Lancet*. 1931. Dec. 19. pp. 1335–1341. With 5 text figs. [11 refs.]

Three cases of gastro-jejuno-colic fistula are recorded, two with a wealth of detail, the third less fully owing to the patient being too ill for tests to be carried out which were possible in the others. No abstract can do full justice to an article so important as this; workers in countries abroad where sprue occurs should study it well and note the points of similarity to and of difference from the real sprue, and practitioners prone to record cases of wasting and diarrhoea with copious pale stools as non-tropical sprue will gain much from a perusal of the article. It is doubly fortunate, therefore, that it has appeared in the *Lancet* and not in a journal appealing merely or mostly to tropical workers.

All three patients had visited tropical countries; the first had lived for 20 years in Malaya, the second for about the same period in Rangoon, the third worked for a steamship company whose vessels went to South America and Ceylon. All presented anaemia of the megalocytic type, with average erythrocyte diameter of 7·8, 8·4 and 8·4–8·6, low colour index, 0·8 in one, 0·6 in the second [erroneously given as 7·0] and 0·9 in the third. The two submitted to detailed examinations had stools with high fat content and adequate fat-splitting; the blood in each case had a reduced calcium figure with low serum-bilirubin, and both responded temporarily to liver extract and treatment for sprue. Points which might in a straightforward case have raised doubts as to the correctness of the diagnosis, but which might be overlooked among the number of positive signs or be regarded as mere anomalies, are the high HCl secretion, the leucocytosis (20,000 per cmm. with 82 per cent. neutrophils in one patient), the ratio of neutral fats to fatty acids not being so disturbed as is usual in severe sprue (1 : 3 and later 1·7 : 1 in the first, and 1 : 2·6 in the second patient) and absence of stomatitis and glossitis in two of the three. The diagnosis was determined in the first by the onset of faecal vomiting, in the second by the discovery of a tumour which at operation proved to be malignant; the third was too ill for operative measures to be undertaken. The authors sound a most helpful note of warning in their conclusion that "any intractable diarrhoea supervening after gastro-jejunostomy should be regarded as originating from a gastro-jejuno-colic fistula until such a diagnosis is disproved," the malabsorption which results giving rise to symptoms closely resembling those of sprue. *H. H. S.*

MILNE (James). **The First Case of Sprue in Malta.** [Memoranda.]—*Brit. Med. J.* 1932. Mar. 12. pp. 471–472.

The patient was an army officer, aged 52 years, a Maltese who had lived all his life in Malta except during four years' war service in the near East. He had suffered from enteric fever 25 years before and from amoebic dysentery in the war, both of which infections are well known precursors of sprue, the symptoms were typical and the blood conditions, chemical and

general, were confirmatory. Improvement followed the administration of dilute HCl, calcium lactate, and Fairley's sprue diet of high protein, low fat and carbohydrate.

The chief interest of the case rests in the fact of its being the first recorded from Malta, though in view of the long interval which may elapse before symptoms declare themselves and of the fact that the patient had been for 4 years out of Malta, contraction of the disease actually in Malta is not proved beyond all doubt, even if the probability is great. *H. H. S.*

SEDAT (H.). Ein Fall von einheimischer Sprue. [**Indigenous [Non-Tropical] Sprue.**—*Schweiz. Med. Woch.* 1932. Mar. 12. No. 11. p. 260.]

This is recorded on the grounds that it is the first indigenous case known in Turkey (Stamboul). The patient was a man of 39 years with many of the characteristic symptoms of sprue, starting with sore tongue and diarrhoea in March 1928. Ten months later he had lost 38 lbs. in weight and he was seriously anaemic—red cells 1,880,000 per cmm., Hb. 47 per cent., colour index 1.3. Whether the anaemia was of the megalocytic type is not mentioned nor the results of faecal analysis. He improved rapidly on a diet containing liver and fruit, with little fat; he was also given calcium, pepsin and pancreatin.

He had never lived in the tropics but during the war was in Mossel [? Mossel Bay, Cape Colony] and Persia (8 months in Hamadan) and later was for 2½ years in Mossel. He did not suffer from diarrhoea in either of these places. He had had an attack of typhoid fever in 1918, and suffered from malaria prior to that, but there was no history of dysentery.

H. H. S.

MONGE (Carlos). El primer caso de sprue señalado en el Perú. [**First Case of Sprue reported in Peru.**—*Crónica Méd.* Lima. 1931. Aug. Vol. 48. No. 818. pp. 245-250. [19 refs.]

——. Premier cas de sprue signalé au Pérou.—*Rev. Sud.-Américaine de Méd. et de Chirurg.* Paris. 1931. Dec. Vol. 2. No. 12. pp. 1197-1203. [20 refs.]

The case here recorded is not altogether convincing. The patient was a Spaniard, 57 years old. Some of the symptoms of sprue were present—copious pasty stools, meteorism, burning sensation in the tongue, and loss of weight—but in the earlier stages the stools were fluid, bilious, occurred after dinner, contained at times mucus and blood [but there was no history of dysentery and anti-dysenteric treatment was of no avail]. The blood picture is said to have been "of the pernicious type," but details are not given to support this; HCl was completely absent from the gastric contents. Chemical tests with the blood and faeces are not mentioned. Cure was effected by "liver and a diet rich in vitamins." *H. H. S.*

CANAL-FEIJÓO (E. J.). Posibilidad de la existencia del sprue en la provincia de Santiago del Estero. [**On the Existence of Sprue in Santiago del Estero.**—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 100-105. [18 refs.]

The author states that sprue has not hitherto been recorded in the Argentine Province of Santiago del Estero, but that he has seen more than a dozen cases in 18 months, and he relates the following as a typical instance:—

A woman of 20 years, after a confinement, suffered from diarrhoea for 15 days, together with generalized abdominal pain. The stools, 6-7 in 24 hours, were liquid, yellow, copious and frothy. After 4 or 5 days of this small ulcers appeared on tongue, cheeks, and pharynx, with salivation. A month after parturition she had a rosy, pruriginous, urticarial rash. For 5 months the diarrhoea and stomatitis recurred at intervals. The liver could be felt below the costal margin. In one of these attacks the stools were scanty, with blood and mucus, and much tenesmus. Examinations revealed *G. intestinalis* (adults and cysts), *Chilomastix mesnili*, Blastocysts and eggs of *Hymenolepis nana*. Blood showed anaemia, red cells 2,240,000, white 7,600 per cmm., normoblasts present and a relative lymphocytosis (33.5 per cent.); other blood examinations such as Ca. and P. estimations are not mentioned and do not seem to have been carried out. Marked improvement followed a diet chiefly farinaceous with bananas and liver. In all the cases observed by the author, there have been flagellates and in some the ova of *H. nana*.

[The geographical distribution of sprue is so peculiar and apparently arbitrary that records of its occurring in fresh localities are always of interest. It is well, however, not to regard all cases of diarrhoea with frothy stools as sprue, and the above presents many anomalies. The liver not reduced in size, if anything enlarged, the mucosanguineous stools accompanied by pain and tenesmus, the presence in practically all cases of flagellates and helminth ova, the urticarial rash, the rapid amelioration on starchy food, are some of the points which make one pause before definitely deciding that these are all cases of sprue.]

H. H. S.

ROGERS (Leonard) & COOKE (W. E.). **Resistant Sprue Anaemia yielding to Intravenous Liver Extract.**—*Brit. Med. J.* 1932. Feb. 13. pp. 272-273. With 1 chart in text.

The patient, a European aged 47 years, contracted sprue in Burma in 1923. He reacted well to milk; relapses occurred in 1925 and 1926 when he improved on milk and streptococcal vaccine, in 1928, with severe anaemia—red cells 1,470,000, haemoglobin 50 per cent., colour index 1.7 [not 1 as stated in the paper]. Transfusion with citrated blood, Fowler's solution by mouth and a milk diet resulted in the blood returning to normal. In July 1929 a fourth relapse occurred clearing up on liver extract and high protein diet by January 1930 [not 1929]; the following July and again in 1931 further relapses occurred, and in the last red cells were below 2 million, Hb. 40 per cent., the anaemia of the megalocytic type. In spite of transfusion the condition became worse and in 5 weeks red cells were down to one million, Hb. 20 per cent.

Hepatex P.A.F. was then tried at the suggestion of Dr. Donald Hunter. 5 cc. of this is equivalent to 100 gm. fresh liver. 22 cc. were injected intravenously during 5 days, 2 cc. on the first, 5 on each of the succeeding four days. The last two doses caused acute abdominal discomfort with pain, vomiting and enlarged and tender liver, but the condition of the blood had improved (r.b.c. 1,800,000 per cmm.). During the succeeding 4 weeks 10 doses of 2-3 cc. each were given intramuscularly with excellent response; on October 22nd red cells were 5,060,000, Hb. 84 per cent. and the patient left hospital. At the end of the year the improvement had been maintained.

As the authors state, the main points of interest are: The rapid response to hepatex intravenously, the acute abdominal condition following the subsequent intravenous injections, and the subsidence of this when the intramuscular route was substituted.

H. H. S.

WILLOUGHBY (Hugh). **The Treatment of Sprue.**—*Jl. Roy. Nav. Med. Serv.* 1931. Oct. Vol. 17. No. 4. pp. 272-277.

This article contains a brief but comprehensive account of the treatment of sprue patients together with the rationale on which it is based. The main fundamental conception being that sprue is primarily a disease of the digestive system, with anemia of either the toxic or the pernicious type as a secondary development, indications for treatment are considered under the heads of dietetic primarily, therapeutic or symptomatic secondarily. Standard dietaries are given: milk for the first week; milk, sago and liver soup for the second, and a more varied convalescent diet to be maintained for 6 months at least. For those who tolerate milk badly or are markedly anaemic, accessory or substitute foods are mentioned, such as raw meat sandwich, soups, fruits, vegetables, etc. The question of drug treatment is dealt with under the headings of diarrhoea, flatulence, anaemia, achlorhydria, constipation, appropriate remedies on the usual lines being suggested for each. Blood transfusion in patients with marked anaemia has often proved of great value, citrated whole blood in small amounts of 10 to 20 cc. being given. The treatment of concomitant disease, e.g., syphilis and amoebiasis, is duly insisted upon, as a prelude to dealing with the sprue itself. A useful recipe is given for preparing liver soup and advice regarding exercise, general régime, return to the tropics and so forth also find a place.

H. H. S.

FAIRLEY (N. Hamilton). **A Note on the Treatment of Sprue with Special Reference to a High Protein Milk Powder.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Jan. 30. Vol. 25. No. 4. pp. 297-304.

"Evidence is steadily accumulating," states the author "that sprue is a disease of the gastro-intestine characterised by deficient gastric secretion . . . as well as by mal-absorption of fats, glucose and calcium in the small intestine." Vitamin deficiency and monilia infection are no longer to be regarded as primary aetiological factors. The dietetic line of treatment set out in this article aims at resting the alimentary tract. Dr. Fairley explains briefly the principles underlying his treatment by high protein, low fat, low carbohydrate diet. In place of high meat protein he has been trying dried high protein milk powder with a ratio of protein 1·0, fat 0·3, and carbohydrate 1·3 with excellent results. With either cows' or buffaloes' milk, widely used in the tropics, to obtain the necessary amount of protein the patient, in spite of his inability to absorb fats, would be taking more fat than even a healthy active man would require. Moreover, tropical milk is in general notoriously impure bacteriologically.

At the author's suggestion the firm of Cow and Gate, Ltd. have prepared a milk powder (Sprulac) which contains as percentages: Moisture 3·0, fat 10·6, protein 34·0, lactose 45·0, mineral matter 7·4; and has a caloric value per ounce of 125. The method of preparation is detailed; the bacterial content is under 150 organisms per cc., whereas a certified T.T. milk contains from 3,000 to 30,000.

Five graded diets are given, from one of sprulac only with a caloric value of about 700 to one with additions giving a value of 2,516. Progress from one to the others may be rapid, the patient often taking No. 5 in 3-4 weeks, when a more liberal dietary can be substituted.

The average stay in hospital of the ten patients here considered was under 8 weeks (54·5 days) ; the gain in weight was 8 lbs. (weight is usually lost until diet 4 or 5 is reached) and the blood showed on an average an increase of 1,750,000 red cells, 20·2 per cent. haemoglobin and a reduction in the megalocytosis to normal diameter. The end results in all were very satisfactory although the early relief of symptoms was perhaps not so dramatic as with the high meat protein ; when liver extract is given in adequate quantities the blood restoration is equally good with the milk as with meat and "sprulac should have a special field of usefulness in the tropics where good quality meat in a satisfactory condition is often unprocureable, and where milk, owing to its high fat and bacterial content, frequently proves an unsuitable diet for sprue cases." [Several misprints have escaped the proof reader.]

H. H. S.

THOMAS (W. S.) & BAUMGARTNER (E. A.). **Red Cell Diameters in Tropical Sprue Cases with Severe Anemia.**—*Clifton Med. Bull.* 1932. Jan. Vol. 18. No. 1. pp. 9–13.

PRICE-JONES has stated that a large coefficient of variation in size of red corpuscles is more constant though less characteristic in pernicious anaemia than a large mean diameter.

The authors have measured 500 cells in each of 17 cases of sprue with severe anaemia and have tabulated their results, giving the erythrocyte count at the beginning of treatment and on leaving hospital—a period varying from a week to 7½ months—the mean diameters, the extremes, the dispersion and the coefficient of variation. In 15 the mean diameter at entry was over 8μ and in 9 it was over this on discharge.

For comparison they took the average findings in 27 cases of pernicious anaemia, 12 detailed by PRICE-JONES and 15 by MEDEARIS and MINOR. The anaemia at entry was of about equal severity in all three series, but at discharge the pernicious anemia patients had improved much more than those with sprue. In the author's series (sprue) the mean diameter, $8\cdot40\mu$, was higher than either of the others, but at discharge the pernicious anaemia showed about the normal average while the sprue had an average still definitely megalocytic. The coefficient of variation in the latter was over 8·3, which was the smallest figure in the PRICE-JONES series of pernicious anaemia.

One patient had been under observation two years before she became severely anaemic and from repeated examinations in the course of 6½ years it was found that "the cells are larger and the variation greater at the period when the most marked anaemia is shown than either before the anaemia occurred or after its improvement under treatment."

H. H. S.

REVIEWS AND NOTICES.

SANDERSON (G. Meredith) [M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H. (Cantab.), etc.] **Elements of Tropical Hygiene. A Text-Book of Hygiene for African School-Teachers.**—118 pp. With 32 text figs. 1932. London: Longman, Green & Co. [2/-]

The author states that his aim in writing this book is to "convey a general idea of the principles of Hygiene and to suggest how they may be applied to the villages of tropical Africa." Believing that this knowledge can best be spread by the personal influence exerted by teachers he has therefore written this text-book specially for their use.

The book is divided into three parts: Part 1 deals with Life and The Body, Part 2 with Some Common Diseases, and Part 3 with Sanitation: this includes chapters on Food, Water, Housing and Personal Hygiene.

The author expresses himself clearly and simply and the advice given is practical and adapted to life in primitive rural communities. A few of the statements perhaps require a certain amount of qualification, as for example—"Except in cold climates the naked body is the healthiest . . . and it is a fact that races that wear least clothing are the most moral." And again, "Machine ground flour contains both husk and germ and is therefore a better food than that prepared by pounding and sifting."

There are very few printer's errors, but on page 15 the germ of sleeping sickness, which is described as like a tiny snake, is illustrated in the diagram as a spirochaete. Most of the illustrations, however, are excellent and the diagrams drawn by Mrs. ANDERSON illustrating African village life are particularly good and should help very much in making the reader see that the subject-matter is really applicable to his daily life.

There is undoubtedly a need for a book on hygiene for the school teacher but opinions will vary as to the necessary content of such a book. A teacher should certainly be familiar with the elements of hygiene and, if he or she has not already learnt these while at school, it will be necessary to supply this knowledge in the teachers' training-schools or in subsequent vacation-courses. One would expect, however, that in a hygiene text-book written specially for teachers definite advice would be given as to how the teacher can best pass on his knowledge to his pupils and how he can most easily find practical demonstration to exemplify the facts. Again, one would expect to find in such a text-book a certain amount of definite instruction as to how the teacher may assist in preventing his pupils from acquiring defects or diseases while actually at school, e.g. owing to defective school buildings, furniture, latrines, lighting, ventilation, etc.; or owing to the spread of epidemics of scabies, ringworm, jiggers, trachoma, yaws and other infectious conditions.

These aspects of the subject are scarcely, if at all, dealt with in this text-book and in the reviewer's opinion it thereby loses somewhat in value as a guide for teachers.

M. G. Blacklock.

SWELLENGREBEL (N. H.) [Professor d. Zoologie a. d. Universit  t Amsterdam, etc.] & RODENWALDT (Ernst) [Inspekteur d. Volksgesundheitsdienstes f. Ostjava]. **Die Anophelen von Niederl  ndisch-Ostindien.** [The Anopheles of the Dutch East Indies.] 3rd Edition.—pp. viii+242. With 44 figs. & 24 maps in text & 24 plates. 1932. Jena: Verlag von Gustav Fischer.

This is the 3rd edition of Prof. Swellengrebel's work, the 2nd (Dutch) edition of which was reviewed in this *Bulletin* (Vol. 19, p. 110) ten years ago. It is larger by 87 pages, but is distinguished by the same judicious proportion and the same clearness and conciseness that characterized the former issue. The first 52 pages are given to matters of general import—

the structure of the imago and larva ; classification, synoptic tables for the specific identification of males and females and larvae, and a critical consideration of the value of the term " species " in the genus *Anopheles* ; a general survey of the geographical distribution of the species in the Netherlands East Indies ; the jeopardy from malaria ; and instructive remarks on capture and collection, manipulation, making and mounting of specimens and preparations, and on the management and breeding of the living insects. The rest of the text contains the diagnoses and descriptions of the subgenera and the species (females, males and larvae) known to exist in the Netherlands East Indies. In their classification of them the authors have achieved a rigorous precision which we need not criticize, since formal systems are so much a matter of opinion. They not only follow the trinomial fashion, but they also recognise " groups " under the subgenus, and binomial " superspecies " under the " groups," and trinomial species and their varieties under the " superspecies." For instance, in the subgenus *Anopheles sensu strictiori* there is placed under a separate *Myzorrhynchus* " group " a " superspecies " *Anopheles hyrcanus*, and under this again a species *A. hyrcanus typicus* having three separate varieties. This seems to be giving rather too much play to the high priests and lawyers of taxonomy. Apart from the taxonomic scheme the systematic descriptive treatment of species, of which there are 35 (or 36) besides 19 varieties, included in 9 subgenera, is a model of exposition and instructive illustration. Following the diagnosis of the subgenus there comes in each case a statement of the differential characters of the superspecies, subspecies, and varieties included in it, and then a concise account of each of these, which includes a critical description of both sexes and larva ; the biology and the pathogenic significance ; and the geographical distribution of the species in the Netherlands East Indies—this being stated in very particular detail and instructively illustrated in an elegant little map for each species. In the case of certain species some attention is given to questions of control. Besides the abundant and well-chosen text-figures and maps there are 24 very neat plates (each of which in the majority of cases is devoted to one species) exposing the more important distinctive features of the species and varieties. The explanations of the plates are eminently sufficient and there is a good index and an ample bibliography. A. Alcock.

HANDBUCH DER HAUT- UND GESCHLECHTSKRANKHEITEN. 1932. Vol. 12. Part I. pp. xi+857. With 503 figs. **Tropische Dermatosen : Juxtaartikuläre Knoten : Rattenbisskrankheit.** [Tropical Dermatology.] Bearbeitet von F. BREINL, F. FÜLLEBORN, H. HOFFMANN, E. MARTINI, M. MAYER, E. G. NAUCK, H. DA ROCHA LIMA, B. SKLAREK, H. ZIEMANN. 1932. Berlin : Verlag von Julius Springer. [Bound Rm. 168 ; Unbound Rm. 166.]

This book, which is the first part of the twelfth volume of the great treatise on skin and venereal diseases which is being published under the auspices of the German Dermatological Society, deals in an exhaustive manner with skin conditions peculiar to the tropics. It includes not only diseases which are strictly cutaneous but also the dermatological manifestations of systemic diseases and the skin lesions produced by insects, helminths and other noxious creatures as a result of contact, biting or penetration. The title of the book gives but a vague idea of its contents, which embrace yaws, juxta-articular nodules, goundou, ulcer tropicum, leishmaniasis, the eruptions associated with sleeping sickness, plague, virus diseases and many other generalized infections, mycoses and blastomycoses, rat-bite fever, to mention only a few. There is a section dealing with ubiquitous skin diseases of coloured races wherein are discussed the peculiarities of the skin of these peoples, its structure, physiology and pathology and the bearing these have on certain diseases which may be regarded as due more or less directly to deviations from the normal.

Another section describes the skin lesions produced by insect poisons which are either injected or merely applied to the skin, the results of invasion of the skin by insects and the toxic effects of other animals. A final section is devoted to a consideration of the lesions associated with helminthic infections. It would appear from a perusal of the book that every skin condition peculiar to the tropics has been passed under review, for the above summary is but the barest outline of the mass of material it contains. The descriptions, so far as it has been possible to read them, appear to be clear, accurate and up to date, while subjects of dispute are discussed with sound critical judgment. This was only to be expected, for the various articles have been written by persons of acknowledged repute and authority. Though built on such an ambitious scale the book retains the highest standard throughout. The subject matter is well arranged, the printing and paper are good, while the 503 illustrations, some of which are coloured, are excellent. The reviewer knows of no book on tropical dermatology which can compare with it. With its very complete bibliographies and its detailed index of subjects and authors there can be no doubt that it will take its place in the front rank of standard works in the field of tropical medicine.

C. M. Wenyon.

VETERINARY BULLETIN. 1932. Feb. & Mar. Vol. 2. Nos. 2 & 3. pp. 65-130; 131-194.—Published by the Imperial Bureau of Animal Health, Weybridge, Surrey, England. [Price 5s. net. Annual subscription £2.]

The *Veterinary Bulletin*, now in its second volume, has become a monthly journal. There are two other changes for the better: though the format is unaltered the line of type is an inch shorter so that the Bulletin can be read without eye-strain; and the summaries are signed. In the numbers under review the matter is arranged under twelve headings with full Contents and an Authors' Index. It is clear that no progressive veterinarian can be without the *Veterinary Bulletin* and that it will be widely consulted by those whose main interest is human medicine, especially parasitology in the larger sense. It is published by the Imperial Bureau of Animal Health, Veterinary Laboratory, Ministry of Agriculture and Fisheries, Weybridge, Surrey, at £2 per annum.

A. G. B.

TROPICAL DISEASES BULLETIN.

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1932.

[No. 7.

MEDICAL ZOOLOGY.

- v. BRAND (Th.). Quantitative Untersuchungen über die Zystenausscheidung von *Entamoeba histolytica* und *Lambliia intestinalis* bei einem gesunden Dauerausscheider. [**Quantitative Investigation of the Cyst-Outcome of *Entamoeba histolytica* and of *Lambliia intestinalis* in a Healthy Carrier.**—*Zent. f. Bakt.* I. Abt. Orig. 1932. Jan. 11. Vol. 123. No. 5/6. pp. 358-365. [12 refs.]

In a healthy carrier of cysts both of *Entamoeba histolytica* and of *Giardia lamblia* the number of cysts of the two species passed during a term of more than 3 months is compared. After a yatren cure the *histolytica* cysts diminished in numbers, and at last disappeared; whereas the *lamblia* cysts throughout were not perceptibly influenced in numbers. (The actual figures and numerical proportions day by day are given in a table.) The inference drawn is that, in this case at any rate, the *histolytica* encysted exclusively in the lumen of the gut.

A. Alcock.

- SHORTT (H. E.) & SWAMINATH (C. S.). **Life-History and Morphology of *Trypanosoma phlebotomi* (Mackie, 1914).**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 541-564. With 2 text figs. & 24 figs. on 5 plates.

Trypanosoma phlebotomi (Mackie 1914) (= *Herpetomonas phlebotomi* of Mackie) is here explained to be the proper name, in accordance with the rules, of illusions subsequently described as *Crithidia phlebotomi* of Mackie et al. and *Bodo phlebotomi* of Shortt. Its reptile host is *Hemidactylus frenatus*, a common gecko lizard of Assam; the insect host is determined to be *Phlebotomus babu* var. *Shortti*.

This is a fine comprehensive study, although its particular details do not come strictly within our purview. The occurrence and the morphology of the trypanosome in the lizard host are described in great detail, and in equally well-considered detail its life-history and various developmental stages in the insect host are followed out.

In a very early stage of development in the gut of the insect the ingested trypanosomes have become motionless ovoid or nearly

spherical bodies devoid of their undulating membrane and having a very distinct periplastic membrane. About 24 hours afterwards these spherical bodies have grown and assumed the form of definite cysts containing from 40 to 60 highly refracting bodies enmeshed in a granular matrix. Each of these encysted refracting bodies represents a trypanosome of proliferation and their number indicates a very active process. The authors emphasize the occurrence of this early proliferation within a free and *independent* cyst, which, as they point out, differs radically from the intracellular phase in the development of *T. lewisi* described by MINCHIN and J. D. THOMSON.

In the final stage of development (reached at the 8th or 9th day after ingestion by the fly) the infection is superlative. Not only do the active forms of the trypanosome swarm in every part of the midgut and invade even the Malpighian tubules, but also the hindgut and rectum are distended by packs of parasites too tightly to permit movement.

Method of retransfer of the infection from the fly to the lizard are discussed—infection by bite of fly through skin of lizard contaminated by fly's disjuncta; ingestion of fly's infected excreta by lizard; and swallowing of infected fly by lizard—the last being the conclusion suggested and supported to a certain extent by experiment. A. A.

HOARE (Cecil A.). *Studies on Trypanosoma grayi. III. Life-Cycle in the Tsetse-Fly and in the Crocodile.—Parasitology.* 1931. Nov. Vol. 23. No. 4. pp. 449-484. With 97 figs. on 4 plates & 3 text figs. [43 refs.]

This is a fine and well-reported study. *Trypanosoma grayi* is one of the largest trypanosomes (blood-forms measuring up to 91 μ) and seems to be harboured by a majority of the crocodiles in L. Victoria and to be non-pathogenous to them. The reptile appears to have a *natural* tolerance that keeps the numbers of the parasite low although not imparting immunity to invasion.

When fed on an infected crocodile the intermediary tsetse-fly (*Glossina palpalis*) takes in not more than about six trypanosomes. These begin to develop in the midgut as crithidia and trypanosomes and later complete their evolution in the hindgut as infective metacyclic trypanosomes which are voided with the faeces and infect the crocodile *per os*. The distribution of the parasite in the course of its development in the gut of the fly is determined by the peritrophic membrane and involves three consecutive currents of migration, namely (1) backwards from the intra-peritrophic space into the colon, thence (2) forwards into the extraperitrophic space and the midgut, and finally (3) backwards to the hindgut.

Evidence is advanced to show that the so-called cysts to *T. grayi* are artifacts. The co-relatives of *T. grayi* are indicated. A. A.

TSUCHIYA (H.). *The Localization of Giardia canis (Hegner, 1922) as affected by Diet.—Amer. Jl. Hyg.* 1932. Jan. Vol. 15. No. 1. pp. 232-246. [16 refs.]

A well-reported study of *Giardia canis* in four puppies experimentally infected, and fed two of them on a richly carbohydrate and two on a richly protein diet. The intestinal distribution of trophozoites in this

study suggested (a) that a carbohydrate diet favoured the development of the flagellate and that a high protein diet did not, and (b) seemed to indicate that there was no correlation between the distribution of the flagellate in the intestine and the varying specific nature of the bacterial flora; encystment, however, occurred at the level where the bacterial flora commenced to show a "complex" facies—suggestive of an environment (induced by large numbers of bacteria) unfavourable to trophozoites. From the nature of the distribution of *G. canis* in this study the author concludes that the zone of its "optimum localization" is the lower part of the duodenum and the entire jejunum, and that the zone of its encystment is the large intestine, especially the caecum.

A. A.

TSUCHIYA (H.). **Studies on Diversity of Strains in *Giardia canis* (Hegner, 1922) and their Biological Variations as affected by Diet.**—*Amer. Jl. Hyg.* 1931. Nov. Vol. 14. No. 3. pp. 577–599. With 3 graphs. [28 refs.]

The author finds that there are—as in man—two strains of *Giardia* in the dog, differing in shape and size and in some details of structure. Change of diet may influence the normal course of cyst development in *Giardia canis*, but whether the change of diet acts directly, or indirectly by changes in the bacterial flora of the dog's intestine, is a question to be answered.

A. A.

KOFOID (Charles A.) & MCNEIL (Ethel). **The Advantages of Locke's Blood Medium in the Culture of Parasitic Protozoa of the Digestive Tract.**—*Amer. Jl. Hyg.* 1932. Jan. Vol. 15. No. 1. pp. 315–317.

The authors recommend as "a very stable medium, and therefore very satisfactory for maintenance of cultures over considerable periods of time," one "known as the L.-E.-B. medium" invented in 1925 by Kofoid and WAGENER. The egg slants are made up of 4 eggs and 50 cc. Locke's solution inspissated at 15 lb. pressure for 30 minutes; the solution consists of Locke's solution 500 cc. and fresh defibrinated rabbit-blood 2.5 cc. Instances of the varied and successful employment of this medium are given.

A. A.

KOFOID (Charles A.), MCNEIL (Ethel) & KOPAC (M. J.). **Chemical Nature of the Cyst Wall in Human Intestinal Protozoa.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Oct. Vol. 29. No. 1. pp. 100–102.

This study from the Zoology Dept. of California University, Berkeley, was made on cysts of *Entamoeba histolytica*, *Endolimax*, "Councilmania," and *Giardia lamblia*. Suitable tests for cellulose, chitin, and lipid were negative. Suitable tests pointed to the only possible conclusion "that the cyst-wall belongs to the albuminoid or scleroprotein group" and has the properties of the group of keratins more nearly than of any other group of scleroproteins.

A. A.

DAVID (N. A.), ANDERSON (H. H.), KOCH (D. A.) & LEAKE (C. D.). **Comparative Toxicity and Protozoacidal Action of Acetarson, Carbarsone, and Certain Related Pentavalent Arsenical Compounds.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Nov. Vol. 29. No. 2. pp. 125–128.

"Comparative oral toxicity studies on guineapigs, rabbits, and cats, and a comparative protozoacidal evaluation on amebae *in vitro* as well as on natural balantidial infestations in guineapigs and on natural monkey

amebiasis indicates that 4-carbamino-phenyl-arsonic acid ('carbarsone') has definite advantages from the standpoint of application to anti-amebic therapy over acetarsone ('stovarsol'), tryparsamide, 'proparsamide,' 'iso-butarsamide,' and 'n-butarsamide.' It is definitely less toxic on oral administration than these compounds and seems generally more protozoacidal in tolerated doses." This is the authors' own summary. A. A.

MAYER (Martin). Ueber die Anämieerreger von Menschen und Tieren, sogenannte Bartonellen. [**On the So-called Bartonella, the Anaemia-Excitant of Man and Beasts.**—Reprinted from *Internat. Ärztlicher Fortbildungskursus*. 1930. Vol. 12. pp. 309–324.]

An excellent and authoritative summary of the anaemias provoked in man and animals by Bartonella. [The story of Bartonella up to the year 1929 is recorded in this *Bulletin*, Vol. 26, pp. 519–524.] A. A.

CLELAND (J. Burton). **Insects in their Relationship to Injury and Disease in Man in Australia. Series III.**—*Med. Jl. Australia*. 1931. Dec. 5. 18th Year. Vol. 2. No. 23. pp. 711–713. [19 refs.]

This does not profess to be an exhaustive paper. References are given to original records and reports. Among these are references to cases of infestation by blowfly maggots; to attacks by *Simulium*—rare in Australia; to cases of death and of anaphylactic shock from bee-stings; to coleoptera, hemiptera, and tree-cricket that may bite man; to cockroaches that may gnaw the nails and skin of sleepers; and to stings from wasps and hornets; and bites from mosquitoes, biting flies, and fleas. References are also to be found to cases of injury by swarms of exasperated ants; in one case a man helplessly intoxicated, who had fallen on an ant-heap was found lifeless, with "the interior of his nostrils and throat" eaten away; in another similar case the man was found with his nose and upper-lip and penis partly eaten away by the ants. A. A.

POMEROY (A. W. J.). **A Report on the Mosquito and Tsetse Problem at Takoradi, 1930–31.**—*Gold Coast Rep. of Laboratory Services Year 1930–31*. Appendix G. pp. 43–60. With 2 charts, 3 folding maps & 3 coloured folding tables.

Takoradi is a maritime township of the Gold Coast, and this report deals chiefly with its mosquitoes, their local incidence, their local breeding-places and the pH value and the salinity of the water, and local drainage. Of 2,551 mosquitoes caught at ten definite stations and at weekly intervals in human habitations during eight months (May–October) 2,159 were *Anopheles gambiae*. Among the exiguous remainder there were 16 *A. funestus*, 19 *A. pharoensis*, 54 *Aedes argenteus*, 42 *Mansonioides africanus* (although *Pistia* marsh was not found in the locality) and a few each of sixteen other species of Culicines. Of 395 specimens of *A. gambiae* dissected during June–October, 28 were found infected with malaria (oocysts); much infestation with undetermined Nematodes was observed also in this species. The tsetse-flies observed during 8 months (June–January) were *G. longipalpis* (most abundant), *G. palpalis*, and *G. medicorum* (4 individuals). A. A.

GALLIARD (Henri). Culicides du Gabon. II. Culiciné. Remarques sur la biologie des *Mansonioides* et d'*Aedes* (*Stegomyia*) *argenteus* Poiret. [Culicini of Gabon. Biology of *Mansonioides* and of *Aedes argenteus*.]—*Ann. Parasit. Humaine et Comparée*. 1931. Nov. 1. Vol. 9. No. 6. pp. 514–529. With 9 text figs. [17 refs.]

Brief notes with some parcel figures on 22 species of Culicini of Gabon. Of *Mansonioides uniformis* and *M. africanus* the author states that they are the most ubiquitous, most ferocious, and most persistent of all the culicine pests of human dwellings, not being deterred by wind or rain nor, in places where there are good-sized rivers, being suppressed in the dry season. Of natural mischances that may befall *Aedes argenteus* he tells the following native story, which was confirmed by a colonist: Near villages in the forest there always are clearings for plantations of taro, the Aroid whose tubers form the staple food of the natives; the water that collects within the spathe that encloses the flowers of this Aroid appears to be suitable for the larvae of *A. argenteus*, but the flowers have a viscid secretion that attracts and clogs the mosquitoes, to such a climax, in some villages, as in a few years to lead to the local disappearance of the species.

A. A.

HINMAN (E. Harold). The Winter Breeding and Activity of Culicine Mosquitoes at New Orleans (30°N. Lat.).—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 459–466. With 2 figs. on 1 plate. [14 refs.]

Periodic survey for about 9 months (Sept. 1930 to June 1931). After a monthly mean temperature of 52.5°F. has been reached there is little outdoor breeding of *Aedes aegypti*, although indoor breeding continues during the coldest months. *Culex quinquefasciatus* [= *fatigans*] and *C. salinarius* continue outdoor development throughout the year, although oviposit may cease during part of January and February.

A. A.

HEYDON (G. M.). Some Common Queensland Mosquitoes as Intermediate Hosts of *Wuchereria bancrofti* (*Filaria bancrofti*).—*Parasitology*. 1931. Nov. Vol. 23. No. 4. pp. 415–427. [19 refs.]

This good paper on common Queensland Mosquitoes in relation to filariasis shows *Anopheles amictus* to be almost equal to *Culex fatigans* as an intermediary host of Bancroft's filaria and *Aedes vigilax* a poor and *Culex sitiens* an insecure host; and confirms the observations of Low and others on the inhospitality of *Aedes argenteus*.

A. A.

ACHUNDOW (I.). Zur Frage der Biologie und das Vorkommen von *Stegomyia fasciata* in Baku (Aserbeidschan, USSR.). [Biology and Occurrence of *Stegomyia* in Baku.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Jan. Vol. 36. No. 1. pp. 31–33.

The only points to note here are that "*Stegomyia fasciata*" occurs in considerable numbers in Baku, adopts wooden washtubs and other

domestic gear for its breeding furniture, and is stated to complete its development there in the laboratory and at a water temperature averaging 25°C., in 9 to 10 days, from egg to complete (fertile) fly.

A. A.

FÜLLERBORN (F.). Ueber den Saugakt der Stechmücken. [**On the Act of Suction by Gnats.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 169–181. With 5 text figs.

The devised experiments on the process of suction in the female *Anopheles maculipennis* here described and illustrated in text-figures support the conclusion that it is the issue of a reflex action. In the case of the insect deprived of its labium, when the tip of the bundle of stylets that forms the pricking and sucking tube is brought in contact with a fluid, the fluid does not—as the author formerly thought—ascend by capillarity, but is aspirated by the initiatory gulp-like working (Schluckbewegungen) of the insect's sucking-pump; and when the insect's mouth-cavity is full of fluid this spasmodic action of the pump becomes converted into a more or less continuous flow until the abdomen is fully distended; this purely reflex process is best observed in the insect deprived of labium because it can nearly always be brought to suck. Compulsory sucking, however, is not easy to bring about in females with the labium intact; but when it is effected one frequently can see alternate to and fro twitchings of the labella and sometimes also agitation of the stylets; this shows that the reflex illustrated in compulsory feeding can be influenced by the insect's "volition." That one is dealing with a purely reflex action is proved above all by the facts that caustic and poisonous fluids are sucked up as readily as water and defibrinated blood, and that suction can continue until the abdomen is distended, and even after decapitation during the act of sucking. [For some interesting work on this subject, by M. E. MACGREGOR, see this *Bulletin*, Vol. 28, p. 504.]

A. A.

MANALANG (C.). **Origin of the Irritating Substance in Mosquito Bite.**—*Philippine Jl. Sci.* 1931. Sept. Vol. 46. No. 1. pp. 39–45. With 2 figs. on 1 plate.

Observations of 4 local species of *Anopheles*, of *Culex fatigans*, and of *Aedes aegypti* showed that inoculation of the contents of their salivary glands into the human skin caused "a typical bite reaction" (contrary to SCHAUDINN's observation) equally with the contents of the diverticula. Individual susceptibility to irritation of course varies in degree.

A. A.

ANDERSON (Drysdale). **Notes on Mosquito-borne Diseases in Southern Nigeria. A Statistical Study in Anopheline Breeding Places.**—*Jl. Trop. Med. & Hyg.* 1931. May 15. Vol. 34. No. 10. pp. 131–133.

This is a methodical and critical study of the local nursery-grounds of *A. gambiae* (= *costalis*) and *A. funestus*, the two outstanding carriers of malaria in S. Nigeria. *A. gambiae* prefers streams rather than ponds,

and open rather than shady waters ; it is not affected by the surface of the water, but has a slight preference for muddy waters and is to be found where the banks are clear of deep-growing vegetation. *A. funestus* although quite at home in pond or stream, much prefers swamp ; its predilections are for shaded waters and for deep-growing vegetation ; it is not affected by the clearness or otherwise of the water or by the nature of the surface. *A. A.*

ANDERSON (Drysdale). **Notes on Mosquito-borne Diseases in Southern Nigeria. II. Mosquito Intensity and Infectivity in Relation to Malaria.**—*Jl. Trop. Med. & Hyg.* 1931. Dec. 1. Vol. 34. No. 23. pp. 389–390.

Actual dissections of mosquitoes during the malaria season show that the infection is disseminated, in the localities studied, almost entirely by *A. gambiae* (= *costalis*) and *A. funestus*. Statistics of infection are given for *A. gambiae* ; the frequency of this species is highest in May-June and its infection-rate rises during this time.

A. A.

EVANS (A. M.). **Observations made by Dr. M. A. Barber on a Melanic, Coastal Race of *Anopheles costalis*, Giles (*Gambiae*) in Southern Nigeria.**—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 443–453. [11 refs.]

This " melanic " race, breeding in brackish swamps near Lagos, can develop in normal term in water of saltness equal to 46 per cent. seawater.

A. A.

DE MEILLON (Botha). **Illustrated Keys to the Full-grown Larvae and Adults of South African Anopheline Mosquitoes.**—*Publications of South African Inst. Med. Res.* 1931. Sept. Vol. 4. No. 28. pp. 275–375. With 200 figs. on 40 plates.

For matter, method, and style, as well as for full and elegant artistic presentation and for practical purpose this finished study of the full-grown larvae and adult females of the South African Anopheline Mosquitoes stands supreme. The obvious distinctive characters of the species are represented in parcel figures on forty beautiful quarto plates, two plates, one for the larva and the other for the adult, being allotted to each species. Besides keys and succinct diagnostic descriptions of species instructive accounts of general and superficial anatomy and of methods of preservation and examination of specimens are given.

A. A.

GALLIARD (Henri). **Culicides du Gabon. III.—Anophelinés. [*Anophelines of Gabon.*]**—*Ann. Parasit. Humaine et Comparée.* 1932. Jan. 1. Vol. 10. No. 1. pp. 85–95. With 6 text figs. [Refs. in footnotes.]

In this part the anophelines of the Gabon are critically noticed—*mauritanus*, *gambiae*, *funestus*, *hargreavesi* (= *marshalli* var.), *pharoensis*,

rufipes, and *wellcomei*—in the distinctive characters of the adult and the larvae, and in certain observed variations. Here again *funestus* and *gambiae* are signalized as the chief carriers of malaria. A. A.

EVANS (A. M.). **Notes on African Mosquitoes.**—*Ann. Trop. Med. & Parasit.* 1932. Mar. 19. Vol. 26. No. 1. pp. 85–108. With 7 text figs. [17 refs.]

Notes (descriptive) on the pupae of some African *Anopheles*; on mosquitoes collected in Liberia; and on the taxonomic position of *Anopheles freetownensis*. A. A.

COVELL (G.). **The Distribution of Anopheline Mosquitoes in India.**—*Health Bull. No. 17. Malaria Bureau No. 8.* 39 pp. With 1 map. 1931. Calcutta: Govt. of India Central Publication Branch. [As.4 or 5d.]

In this very useful publication Part I gives the distribution of Anopheline mosquitoes in India and Ceylon by species, listed in alphabetical order. Part II gives their distribution by Sub-divisions, Districts, or States, which also are placed in alphabetical order; a key map of India and Ceylon shows the geographical boundaries of these political sub-divisions. A. A.

IYENGAR (M. O. T.). **Anopheles Breeding in Relation to Season.**—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 917–939. With 12 charts in text.

Records of a systematic survey of all kinds of *Anopheles*' natural breeding-waters in a rural area including eight large villages, in the plains of Lower Bengal. The survey continued for a term of more than five years and the breeding-places were visited twice a month during that time. Eleven species were recognized, and although most of them bred all the year round each species had its definite season of increase. Of all the species there were only four—*aconitus*, *varuna*, *philippinensis*, and *tessellatus*—in which this season of increase corresponded with the season of malaria. A. A.

SWEET (W. C.) & RAO (B. A.). **Dissections of Female Anophelines in Mysore State.**—*Records of the Malaria Survey of India.* 1931. Dec. Vol. 2. No. 4. pp. 655–657.

This malaria-mosquito inquest of the Mysore State was continued from 1st October 1928 to 31st December 1930—twenty-seven months. Three stations were established in different parts of the country and collections of living adult anophelines were made "bi-weekly" at definite places in each station. Furthermore, supplementary collections were made during the course of the inquest at three places where epidemics of malaria were reported. The captured insects were kept alive usually for 72 hours before examination.

Dissections (stomach and glands) of 31,277 of them were made and checked. These dissections comprehended nineteen species—6,377 *jeyporiensis*, 5,980 *subpictus*, 1,224 *aconitus*, 1,135 *vagus*, 788 *fuliginosus*, 487 *jamesii*, 223 *hyrcanus* var. *nigerrimus*, 220 *tessellatus*, 137 *pallidus*,

200 collectively of *barbirostris*, *karwari*, *maculipalpis*, and *philippinensis*, and a trifle (14) of *turkhudi*, *leucosphyrus* and *majidii*; but no infection is recorded in any of the 16,785 individuals of these sixteen species. Infection was discovered only in 8 individuals (1 stomach, 7 glands) of 5,748 *culifacies* dissected; in 1 individual (glands) of 6,034 *listonii* dissected; and in 2 individuals (stomach) of 2,710 *stephensi* dissected. (Infections reported in 56 individuals of various species were not confirmed by final expert criticism). A. A.

RUSSELL (Paul F.). **Daytime Resting Places of Anopheles Mosquitoes in the Philippines. First Report.**—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 639-649. With 7 figs. on 4 plates [26 refs.]

A short review of "the problem" of catching adult anophelines in their day-time resting-places in tropical countries, as exemplified in published reports. Besides houses and sheds for domestic animals, the author notices in the Philippines the sides of wells, crevices in the soil and in shaded old stone walls, and shaded and overgrown banks of streams as resting-places, observed in routine collecting. Some photographs of such resting-places are given. A. A.

KING (W. V.). **The Philippine Anopheles of the Rossi-Ludlowi Group.**—*Philippine Jl. Sci.* 1932. Mar. Vol. 47. No. 3. pp. 305-342. With 4 plates & 6 text figs. [20 refs.]

This is another of those strenuous exertions on the hill of taxonomy that put one in mind of the labours of Sisyphus the son of Aeolus. The author recognizes in the Philippines five species of *Anopheles* of "the *rossi-ludlowi* group" and here gives the characters which he considers to be distinctive of each and his conclusions in the matter of nomenclature. A. A.

MORISHITA (Kaoru). **Comparison of Formosan Anophelines with Related Forms from India and Malaya with Regard to the Problem of their Identification.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Feb. Vol. 31. No. 2 (322). [In Japanese. English summary pp. 17-20.]

According to the author who has made critical comparisons in India, the F.M.S., and Java, the species of *Anopheles* represented in Formosa are *sinensis*, *minimus*, *tessellatus*, *fuliginosus*, *maculatus*, *maculipalpis* var. *indiensis*, *ludlowi*, and *jeyporiensis*. A. A.

DE BUCK (A.) with SWELLENGREBEL (N. H.). **Das Vorkommen von zwei verschiedenen Rassen des *Anopheles maculipennis*, als Erklärung des Anophelismus sine Malaria in Niederland. [The Existence of Two Different Races of *Anopheles maculipennis* as an Explanation of Anophelism without Malaria in the Netherlands.]**—Reprinted from *Verhandl. d. Deut. Zool. Gesellschaft.* 1931. pp. 225-230. With 1 text fig.

[The essentials of this paper have already been stated in a paper by these authors and E. SCHOUTE, which has already been abstracted in Vol. 27, pp. 910-911 of this *Bulletin*. In that abstract reference is given to earlier papers on the subject.]

Here, the differences, morphological and biological, between the two races are more formally stated and the difference in their eggs is figured. A. A.

MARTINI (E.), MISSIROLI (A.) & HACKETT (L. W.). Versuche zum Rassenproblem des *Anopheles maculipennis*. [**The Race Problem of *A. maculipennis*.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Nov. Vol. 35. No. 11. pp. 622-643. With 5 text figs.

The authors refer to ROUBAUD's "zoophile" race in non-committal terms, and to the Netherlands *atratus* race of the Dutch observers, both of which have been noticed frequently in this *Bulletin*; but their attention is here focussed on FALLERONI's *labranchiae* and *messeae* varieties of *Anopheles maculipennis*, the former with lighter, the latter with darker eggs. These and other varieties of eggs of the species are differentiated with an abundance of excellent figures. The paper is of interest to malariologists in countries where *A. maculipennis* is the only ubiquitous species, and in localities there where a formal explanation of the phenomenon of anophelism without malaria is sought. A. A.

ACHUNDOW (I.). Die Fauna der Culicidae der Republik Aserbeidschan. [**Culicid Fauna of Azerbaijan.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Nov. Vol. 35. No. 11. pp. 671-677. With 3 text figs. [10 refs.]

Malaria is the prevalent malady in the republic of Azerbaijan. Seven species of *Anopheles* exist there—*maculipennis*, *elutus*, *bifurcatus*, *nigripes*, *pseudopictus* (*hyrcanus*), *superpictus*, and *pulcherrimus*; the author describes their local distribution and goes into details of breeding-place and comparative importance. A. A.

HERMITTE (L. C. D.). Occurrence of *Anopheles gambiae* (*costalis*) in Aldabra Islands (Seychelles).—*Records of the Malaria Survey of India*. 1931. Dec. Vol. 2. No. 4. pp. 643-654. With 2 maps in text & 12 figs. on 3 plates.

The Mahé or Seychelles Archipelago includes a number of small islands (of which Mahé is the largest) that spring from the greatest depths of the Indian Ocean in an area about fifteen-hundred miles to the north-east of Madagascar. Some of these islands are mere atolls, but most of them are rocky and mountainous. The Seychelles have an established reputation as "being extremely healthy and above all free from malaria and its transmitter the *Anopheles*."

At several points in the oceanic depths between the Seychelles group and Madagascar there are other clusters of coral banks and coral islets—the Amirante, the Alphonse, the Providence, the Aldabra groups—which, though severally distinct and distant, are included in the Seychelles administration. It is of these, and in particular of Aldabra, that this paper treats, since Aldabra was convicted of a malaria epidemic in 1908, and—as here reported—was discovered quite lately to be infested with *Anopheles gambiae* (= *costalis*), the dangerous African malaria-carrier, now become notorious as a dexterous coloniser in countries far beyond the African continent. Before the year 1908 not any case of malaria had been known to originate in any of these groups. In April of that year, about three weeks after the arrival of a

ship carrying some coolies from a notoriously malarious district in Madagascar, an outbreak occurred in Aldabra. The epidemic was active until the end of September. At the end of January 1909 the atoll [Aldabra] was quite free from the disease. During and after this outbreak "exhaustive searches" were made for a criminal *Anopheles*, but the result was fruitless, the only larvae found were *Culex* and *Stegomyia*. After the epidemic of [April-September] 1908 malaria was never heard of again in Aldabra until [October-November] 1930"; and this time larvae of *Anopheles gambiae* were discovered "in profusion" in the western island of the atoll. A. A.

ROY (D. N.). **The Natural Breeding Habits of *A. stephensi* as observed in Calcutta.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 617-628.

——. **On the Ovulation of *A. stephensi*.**—*Ibid.* pp. 629-634.

——. **On the Breeding Habits of *A. stephensi* as observed in the Laboratory.**—*Ibid.* pp. 635-639.

It is here stated that *Anopheles stephensi* is at present the only dangerous species that breeds in the "central portion" of Calcutta. [In 1905 another dangerous species, *A. listoni*, kept company with it in the European centre of Calcutta]. Its permanent breeding-places there are overhead cisterns, builders' vats for soaking bricks, tanks, and drains; for temporary nurseries it has in the rainy season puddles and the tins and such-like thrown out by the blunt monster with uncounted heads. It is essentially a surface feeder. The adult female feeds on any kind of warm-blooded animal; if correlatively fed it can produce 3 batches of eggs; one individual delivered 8 batches. The eggs don't stand drying. A. A.

BRADLEY (G. H.). **Feeding Tests of Anopheline Mosquitoes with Leguminous Plants.**—*Jl. Econom. Entom.* 1931. Dec. Vol. 24. No. 6. pp. 1229-1233.

With reference to the argument of WILLCOCKS and of D'HERELLE attributing the absence of malaria in cultivated Egypt to the abundance of clovers and other Papilionaceae that contain coumarin, a substance claimed to be able to make mosquitoes resistant or immune to malaria, the observations of the present author, whose experiments were made with three common species of N. American *Anopheles*, and clover and six other kindred species of plants "seem to indicate that mosquitoes do not feed to any extent on either the blooms or foliage of legumes; that legumes are not attractive to mosquitoes; and that when confined in cages with legumes, mosquitoes obtain little if any sustenance from the plants." A. A.

PARROT (L.). Observations biologiques sur *Phlebotomus papatasi* (Scop.). [Biological Observations of *Phlebotomus papatasi* (Scop.).]—*Arch. Inst. Pasteur d'Algérie.* 1931. Sept. Vol. 9. No. 3. pp. 442-450. [23 refs.]

P. papatasi is bred in Algiers from a stock of captured females fed in and imported from Biskra. On arrival the eggs (and larvae already

hatched) are incubated at 22°, 25°, or 28°C. in pots of unglazed earthenware. The nutrient medium employed is garden soil heated to 65°–70° and mixed with 10 per cent. of dried pig-blood; or ordinary earth with rabbit or lizard dung. The optimum of moisture is hard to define—let the surface of the medium look fresh and feel still crumbly, not wet. Development in the laboratory is influenced, but not too rigidly in every culture, by temperature; at 22° the term from egg to adult ranges from 144 to 197 days; at 25°, from 47 to 92 days; at 28°, from about 39 or 43 days to about 69 or about 70 days. The author has not observed the phenomena called pseudohibernal asthenobiosis by ROUBAUD; larval development has always been regular; nor has any abnormal and excessive pause in pupation, or any precocious emergence of males, been noticed. Coupling of the sexes may occur either before or after the first feed of the female. Although laboratory-bred females may feed on the gecko *Tarentola mauritanica* quite readily, the author has never found nucleated red cells in the stomach of female *papatasii* caught in Nature—in striking contrast with *P. minutus* and *P. parroti*. Experiments with larvae and with females of *P. papatasii* descended from females fed on *Leishmania tropica* did not give any evidence of hereditary transmission of the infection; and feeding attempts to infect *P. papatasii* with *Leishmania tarentolae* of the gecko disclosed *P. papatasii* to be not favourable as a host-species of *L. tarentolae*. A. A.

THEODOR (O.). On African Sandflies (Dipt.).—*Bull. Entom. Res.* 1931. Dec. Vol. 22. Pt. 4. pp. 469–478. With 6 text figs. & 5 figs. on 2 plates. [14 refs.]

A critical re-examination and revisal of some of the African species of *Phlebotomus*, with some short diagnoses of some new species. A. A.

TANGANYIKA TERRITORY. Tsetse Research Annual Report for the Year ended 31st December, 1930 [SWYNNERTON (C. F. M.), Director].—pp. iii+48. With 12 figs. on 6 plates, 1 map & 1 chart. Dar-es-Salaam: Govt Printer. [2s. 6d.]

This methodical investigation, qualified by its experimental trend, of tsetse-fly belts in Tanganyika shows them to consist of so-called "communities" [an unhappy term, since it suggests a definite social organization] seasonal or semipermanent, some of which are feeding-grounds and others breeding and resting-grounds, and it has also led to recognition of those kinds of environment that are the most—and the least—important to each species of fly as indicated by density, distribution and other circumstances of the environment and season. The better the country becomes known the stronger grows the conviction that there is no single method for extirpating fly, and that all reasonable methods must be tried experimentally. That various methods and results may be so studied simultaneously the fly-belt at Shinyanga has been split into blocks separated by clearings convenient for isolated experiment.

The sections of the Report that are of general interest are those dealing with (a) attempts to exterminate the fly; (b) attempts to prevent its incursions and spread; and (c) those on biology and bionomy.

(a) *Experimental Attack on the Fly*. Organized burning of grass late in the season has resulted in great reduction in the density of the fly in

some blocks. An unusually wet rainy season, ending in flooding of low-lying grass areas has contributed to this reduction by killing flies and drowning puparia and has suggested a plan of alternating years of fierce organized burning with years of intermission of burning. In areas where organized burning of grass is not applicable the following methods of "direct" attack have been experimentally tried:—Breeding and liberating *Syniomosphyrum glossinae*, the hymenopterous parasite of *G. morsitans*. Propagation of a pathogenous fungus of the fly. Bird-liming the backs of peripatetic bicyclists. Fly-catching by means of screens and various traps. Among traps Harris's trap has been favourably investigated by Dr. Phillips. All these methods, of course, assume an accurate and extensive knowledge of the haunts and concentrations of the fly. Among methods of "indirect" attack the following have been investigated:—Thinning of the bush by selective destruction of particular species of the flora. Complete cessation of grass-burning for long terms, the very long rank grass being obstructive to fly. Or, on the contrary, complete clearing of dense fly-centres and planting settlers there.

(b) *Experimentation in the creation of barriers against Fly.* First come solid Game barriers—palisades of living posts of Commiphora, of living epiphyte figs or of agave and other spiky and thorny shrubs, or of cuttings or seedlings, etc., of suitable trees; here the interference of termites (although sometimes it may be useful) has to be watched. Next come obstructions to the spread of fly, and these may either be true barriers of dense thicket consisting of chosen belts of natural matted vegetation or of broad belts of thick evergreen plantation; or on the other hand they may be broad open straits of felled and cleared jungle. Various methods of making these bare strips, by felling, injuring, or poisoning trees, or by the aid of termites are considered.

(c) *Biological and bionomical observations.* With regard to *G. morsitans*, flies do not emerge from pupae much during the wet seasons, the great emergence is just after the end of the big rains. Very few puparia have been found outside the customary sites. This species has preferences for certain types of woodland, where it concentrates and may be attacked in the later dry season. Only large movements of game cause a marked increase in fly density and female percentage. The fly seems to hunt entirely by sight. Female flies may be active in the early morning when humidity is high at a time when males are mostly inactive. Many observations have been made and are recorded at length about fly "centres" and concentrations—female centres, seasonal concentrations, male areas, and various other "types of concentration"—some of which are undoubtedly feeding grounds, although others still seem to be rather ill-defined. Much, however, has been learned of the relations of the fly to season and to its environment. With regard to *G. swynnertoni*, it lives in disconnected patches within the more open woodland, disliking dense bush and long grass, and it may travel more than two-thirds of a mile to its feeding-grounds, independent of artificial transport.

Since 1930 experiments have been carried on in working cattle undergoing injections of tartar emetic in fly country. Of 38 head of cattle so used 29 are alive and look well.

The general conclusion is that the Shinyanga scheme of "large field experimentation" has yielded results of high practical value and great promise. Of the enterprising spirit in which the experimentation has been conducted this report is a lively document.

A. A.

STRONG (Richard P.), BEQUAERT (Joseph C.) & CLEVELAND (L. R.).
Report on the Available Evidence showing the Relation of Game to the Spread of Tsetse Fly borne Diseases in Africa.—*Special Publication Amer. Committee on Internat. Wild Life Protection.* 1931. Vol. 1. No. 1. 46 pp. [Refs. in footnotes.]

Since the whole of this useful publication is an orderly summary of recorded evidence it is only needful to indicate the authors' considered conclusions and judgments, without comment. From impartial consideration of the evidence they conclude (1) That with regard to the species of trypanosomes responsible for sleeping sickness in man, the evidence considerably suggests that *T. gambiense* and *T. rhodesiense* are slightly varying races of a single species—the evidence that these are two distinct species being inconclusive. (2) That with regard to the proposition that wild game serve as hosts or reservoir of the specific trypanosome of the said malady the evidence in substantiation is (a) not extensive; (b) to a considerable extent suggestive of doubt; or at most (c) suggests "that a trypanosome of animal origin, in a few instances when the trypanocidal power of the human serum appears to be reduced, can adapt itself to man." Here the evidence which suggests that wild game may act as reservoir for *T. gambiense* of man is, of course, cited and adjudged.

The authors find (3) That along with some negative evidence "there is also some positive evidence that wild game act as the reservoirs for the trypanosomes which cause disease of domestic animals." In citing this evidence in their summary, they include J. F. CORSON's demonstration (since this report was written) that *T. rhodesiense* in blood from human cases of sleeping sickness when inoculated into sheep and goats will produce fatal trypanosome infection in those animals.

Their other pronouncements are that (4) "No definite proof has been submitted to show that the abundance of game has a definite relation to the number of tsetse-flies present in a given district. . . (5) There is certain evidence presented which shows that tsetse-flies will sometimes migrate with game. (6) The relationship between the presence of game and the breeding-places of tsetse-flies varies somewhat with the species. In the case of *G. morsitans* and other tsetse-flies of similar habits, there is some evidence that the breeding-places are generally close to areas where wild game is fairly abundant. (7). . . there is little evidence that *G. palpalis* and *G. tachinoides* depend on wild game. In the case of *G. morsitans*, apparently this fly feeds chiefly in nature upon wild game."

Finally they conclude against the probability of exterminating either *G. palpalis* or *G. tachinoides* by eliminating wild game, though "there seems to be some evidence that *G. morsitans* will disappear when the large wild game animals are considerably reduced." A. A.

PEREKROPOFF (G. I.) & STEPANOFF (P. I.). Zur Frage der Darmerkrankungen des Menschen, die durch Octomitius bedingt sind. [The Question of Octomitius as a Cause of Intestinal Disease in Men.]—*Zent. f. Bakt. I. Abt. Orig.* 1932. Jan. 11. Vol. 123. No. 5/6. pp. 324–330. With 15 figs. on 1 plate. [10 refs.]

A ceremonious account (with a plate of figures) of *Octomitius rastegaiev* (described as a new species) found in the faeces of a patient (who seems

to have been definitely tuberculous at some time), who complained of chronic diarrhoea and of pain in the abdomen, gall-bladder, and liver. Chiefly from the fact that under treatment all these symptoms disappeared along with the disappearance of the Octomitus, the authors decide that Octomitus must be included among the intestinal parasites of Man. A. A.

DOS SANTOS (Ribeiro). Localisation rare de l'*Hypoderma bovis* chez l'homme. [**Rare Location of *Hypoderma bovis* in a Man.**].—*Ann. Parasit. Humaine et Comparée*. 1931. Nov. 1. Vol. 9. No. 6. pp. 512–513. With 2 text figs.

The larvae of *Hypoderma bovis* here figured were taken from the membrum virile of a Brazilian rustic. The man had a history of having innocently slept out in the grass, *sub Jove*, one night, but had attributed his affliction to the handmaids of Venus. A. A.

WALKER (E. M.). **Cutaneous Myiasis in Canada.**—*Canadian Public Health Jl.* 1931. Oct. Vol. 22. No. 10. pp. 504–508. With 2 text figs.

Cutaneous myiasis is said to be rare in Canada (or never reported) but since 1919 eight cases, all in infants, have come to the author's notice—in Toronto, Ontario, and Winnipeg—all due to *Wohlfahrtia vigil*. A. A.

PRADAL & SOUCHARD. Sur un cas de pseudo myase rampante observé en Cochinchine. [**A Case of Creeping Pseudo-Myiasis in Cochinchina.**].—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. Sept. Vol. 22. No. 8. pp. 615–618.

The usual intolerable itching attended the progress of the lesion. When the advancing end of the burrow was lanced, an ancylostome larva was discovered in the exudation. The wound healed in a few days, and the patient declared himself cured fifteen days afterwards. A. A.

SMIT (Bernard). **A Study of the Sheep Blow-Flies of South Africa.**—*Union of South Africa. 17th Rep. Director Vet. Services & Animal Industry, Onderstepoort, Pretoria*. 1931. Aug. Pt. 1. pp. 299–421. With 9 plates (3 coloured), 5 diagrams (4 folding) & 5 figs. [177 refs.]

Although the discourse is of blow-flies whose maggots torment and destroy sheep in S. Africa and hamper the wool-trade it contains much information on the habits, bionomy, biology, parasites, deterrents of these scourges that is informative to the medical and sanitary zoologist. A. A.

HOBSON (Ralph Percival). **On an Enzyme from Blow-Fly Larvae (*Lucilia sericata*) which digests Collagen in Alkaline Solution.**—*Biochem. Jl.* 1931. Vol. 25. No. 5. pp. 1458–1463. With 1 text fig.

The proteolytic enzymes, obtained from the excreta of larvae of *Lucilia sericata*, digest collagen (from tendo Achillis of ox and from catgut) and elastin (from ligamentum nuchae of ox), but not keratin

(from pure wool). The enzyme that digests collagen is produced by the cells of the midgut. The excreta digest collagen in alkaline solution. The separate existence of collagenase is inferred from absorption and stability experiments. A. A.

KING (H. H.) & PANDIT (C. G.). **A Summary of the Rat-Flea Survey of the Madras Presidency, with a Discussion on the Association of Flea Species with Climate and with Plague.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 357–392. With 14 maps & 1 chart.

The thirty local surveys here summarized (and illustrated by 14 maps) took 20 months, from Sept. 1928 to April 1930. Of 17,246 rodents caught 16,607 were *rattus* and only 294 *norvegicus*, with a few bandicoots, mice, and gerbilles. Of 82,708 fleas examined 59.9 per cent. were *Xenopsylla astia*, 33.5 per cent. *X. cheopis*, and 5.9 per cent. *X. brasiliensis*, most of the remainder (0.7 per cent.) being *Leptopsylla musculi* and *Ceratophyllus nilgeriensis*, both of which were restricted to Ootacamund in the Nilgiri Hills.

X. astia was found everywhere, in many towns it was the only species. *X. cheopis* seemed to have some propensity—not absolute or constant—for a moister and cooler “climate.” *X. brasiliensis* was the chief species of places on or close to the Mysore plateaux. *X. astia* is regarded as indigenous, *X. cheopis* as an active invader, but of *X. brasiliensis* the evidence is not conclusive. The authors agree with HIRST and with CRAGG that in S. India plague is mainly caused by *X. cheopis*, it being undoubtedly a more effective carrier than *astia*, and probably more effective than *brasiliensis*. In the areas of their distribution *X. brasiliensis* was almost certainly, and *Ceratophyllus nilgeriensis* was probably, a participant in plague-causation. The authors also agree that *X. cheopis* is helped to spread chiefly by the cotton and grain trades, especially by cotton. They much have to say on the influence of climate on the distribution of fleas in S. India, but nothing very conclusive or impressive. A. A.

WALKER (J. Norman), CHENOY (C. F.) & RAO (S. Raghavender). **Rat-Flea Survey of the City of Hyderabad (Deccan).**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 657–673. With 2 maps in text.

The survey lasted for a term of 19 months, from Sept. 1929 to March 1931. The combined area of the municipality and its suburbs is about 60 sq. m. with a population of about 375 thousand. The average mean temperature of the locality is 61°F. in December and 105°F. in May, and the average rainfall 31 inches. There is much varied and multifarious trade. The grain-markets were insanitary and were heavily infested with rats. There have been 13 epidemics of plague between the years 1911 and 1931.

Of 115,475 of the trapped rodents and other vermin examined 85,906 were *Rattus rattus*, 28,768 mice, 54 bandicoots, 65 *Gunomys varius* and 682 muskrats. Of 13,746 fleas caught 12,949 were *Xenopsylla cheopis*, 794 were *X. astia*, and the remaining 3 were *Ctenocephalus* and *Ceratophyllus*. A. A.

- i. KOPSTEIN (Felix). **Rats and Ratfleas of Java. A Guide for Identifying the Species concerned in the Study of the Epidemiology of Plague.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1931. Vol. 20. Pt. 1. pp. 35-72. With 18 text figs. [Refs. in footnotes.]
- ii. ——. **Die Ökologie der javanischen Siphonapteren und ihre Bedeutung für die Epidemiologie der Pest. [Oecology of the Fleas of Java and their Significance in the Epidemiology of Plague.]**—*Ztschr. f. Morphologie u. Ökologie d. Tiere*. 1932. Vol. 24. No. 2. pp. 408-434. [24 refs.]
 - i. This, as its subtitle implies, is a compilation intended as a guide for identifying the species of rats and rat-fleas concerned in the epidemiology of plague, particularly in Java.
 - ii. This paper contains much information about *Xenopsylla cheopis*, *X. astia*, *Stivalius cognatus* (= *Pygiopsylla ahalae*), and their local hosts and distribution in Java, and a few remarks on *Neopsylla sondaica* and *Pulex irritans*. It also gives a list of the (twelve) known species of Javan fleas; a list of the (six) known species of Javan rat and shrew fleas; and a list of the known hosts of Javan fleas. The authentic species of fleas of Javan house rats and houseshrews are stated to be *X. cheopis*, *X. astia*, *Stivalius cognatus*, and *N. sondaica*. A. A.

CARRIÓN (A. L.). **Final Report on a Rat-Flea Survey of San Juan, Porto Rico.**—*Public Health Rep.* 1932. Jan. 22. Vol. 47. No. 4. pp. 193-201. With 5 charts in text.

In this survey of three consecutive years 1,005 live rats were caught, their concentration being greatest at the water front and the residential sections. From about 57 per cent. of the rats a total of 7,145 fleas was obtained, the flea-index being highest at the docks (nearly 4 per rat) and the commercial district (nearly 6 per rat). The rats were 72 per cent. *R. norvegicus*; 13 per cent. *R. rattus*; and 15 per cent. *R. alexandrinus*. Five species of fleas were encountered, 98.5 per cent. being *Xenopsylla cheopis*. A. A.

CARNES (E. H.). **Rat-Flea Survey of the Port of St. Thomas, Virgin Islands.**—*Public Health Rep.* 1931. Oct. 23. Vol. 46. No. 43. pp. 2558-2562. With 1 chart in text.

Of 312 rats trapped in 12 months (July 1929-June 1930) at Port St. Thomas 309 were *R. alexandrinus* and 3 *R. rattus*. Of their 2,113 fleas taken 2,108 were *Xenopsylla cheopis* and 5 cat or dog fleas. Rat-flea index, average 6.7, highest during summer (March-September), varied directly with temperature and rainfall A. A.

MARCANDIER (M.) & PIROT (R.). **Etude sur les ectoparasites des rats de Toulon. [Study of the Ectoparasites of the Rats of Toulon.]**—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 237-244.

A comparative study of 384 rats caught at Toulon, 285 in the war-ships stationed there, the rest ashore in the town. Of the war-ship rats 187 were *rattus* and 98 *decumanus*. On both species *Xenopsylla*

cheopis was far away the predominant flea (index 3.6 for 41 *decumanus* and 2.5 for 76 *rattus*). Some individuals of *X. cheopis* that were caught from *decumanus* were parasitized by larvae of *Protospirura muris*. Another flea common not much on adult rats but among the newborn naked nestlings in the nest was *Ceratophyllus fasciatus*. Three other fleas found, each only once, were *Pulex irritans*, *Ctenopsylla musculi*, and *Ctenocephalus canis*. The other ectoparasites of war-ship rats were the common rat-louse (*Haematopinus*) and the ratmite *Dermanyssus muris*, the latter—which also attacks man—frequently on the adult rat, but more often in the rat-nest.

Of the Toulon rats caught ashore not a single one was *rattus*—all were *decumanus*. Excepting *Pulex irritans* their fleas were the same as those of the ship rats, but *Ceratophyllus fasciatus* was twice as abundant as *X. cheopis* and nearly twice as abundant as *C. musculi*. Their other ectoparasites were the common *Haematopinus*, *Laelaps echidninus* and *Dermanyssus muris*—all three abundant—and (found on one occasion) *Laelaps nuttalli*. A. A.

LEESON (H. S.). **Methods of Rearing and Maintaining Large Stocks of Fleas and Mosquitoes for Experimental Purposes.**—*Bull. Entom. Res.* 1932. Mar. Vol. 23. Pt. 1. pp. 25–31. With 5 text figs.

Here are minutely described, with explanatory figures, the apparatus and methods of employing them for the continuous breeding and manipulation of fleas and mosquitoes required in the laboratory. The detail cannot be summarized. A. A.

RIVNAY (Ezekiel). **Studies in Tropisms of the Bed Bug *Cimex lectularius* L.**—*Parasitology*. 1932. Mar. Vol. 24. No. 1. pp. 121–136. With 9 text figs. [20 refs.]

The ingenious and interesting experiments with bedbugs, here fully reported, led the author to the following among other conclusions. Although bedbugs detect heat very slowly, heat is an important factor in stimulating them towards food, and light and atmospheric humidity do not to any great extent influence this reaction, though moulting and also the state of nutrition do interfere with it, and a too high temperature causes a retreat. Bedbugs have a sense of smell; the odour of blood, muscle, subcutaneous tissue, and clean washed skin seemed to have no influence, but the odour of bile repelled and that of liver first attracted and then repelled them, and that of sweat was sometimes repellent and sometimes attractive, the sebaceous contribution (and also cerumen) having the greatest attractive effect. Negative reactions to water counterbalanced positive reactions to heat and odour—the insect shuns water. In a choice between water, sugar solution, chicken broth, and blood serum deprived of haemoglobin, this last “was always the most acceptable and the bugs of all stages gorged themselves with this fluid”; the author thinks this to be evidence of discrimination by taste. The underlying cause for the gregarious habit of bedbugs “seems to be a tendency to be in contact with some object rather than the preference for darkness.” A. A.

VOLLMER (Ortrud). Kleidermotten als Fresser lebender Zecken. [**Clothes-Moths feeding on Living Ticks.**]—Reprinted from *Ztschr. f. Angewandte Entom.* 1931. June. Vol. 18. No. 1. pp. 161–174. With 4 text figs.

The author (working in the insectary of the department of biology and medical entomology of the Tropical Institute of Hamburg) tells how in a tube containing some filter-paper with eggs and new-hatched larvae of the tick *Ornithodoros moubata* he noticed on the paper some loose threads of web with entangled lumps of faeces and two caterpillars of the clothes-moth (*Tinea biselliella*); how he put the caterpillars into a separate tube, with some filter-paper but without food, and found next day that one of them had half eaten the other (and subsequently continued and completed its development); and how a re-investigation of the original tube led him to suspect that the said caterpillars must have been living before they were noticed on the living eggs and larvae of the tick. Further observations recorded in unremitting detail and at great length convinced him that his inference was right. Two illustrations, one showing part of the cast skin and the faeces of a caterpillar in dangerous proximity to the much-abraded body of an *Ornithodoros* larva of the 2nd stage; the other a caterpillar embracing the battered body of a fair-size *Argas* larva, are given to complete the account; but the author often saw a caterpillar and tick larva *flagrante bello*. A. A.

ROUBAUD (E.) & COLAS-BELCOUR (J.). Etude sur les Ornithodores, du groupe *lahorensis* dans l'Afrique du Nord. Description d' "*O. delanoëi*" n. sp. [**On the Lahorensis Group of Ornithodoros in North Africa. Description of "*O. delanoëi*" n. sp.**]—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 948–957. With 4 text figs. & 3 figs. on 1 plate.

Description with good figures of *O. delanoëi*, a new species, taken from porcupine earths in W. Morocco, close akin to *O. foleyi* of Parrot from the Algerian Sahara, and to *O. franchinii* of Rondelli from Italian N. Africa. The three species along with *O. lahorensis* are here regarded as forming a "group." A. A.

KRIJGSMAN (B. J.) & PONTO (S. A. S.). Die Verbreitung der Zecken in Niederländisch-Ostindien. [**Distribution of Ticks in the Netherlands East-Indies.**]—*Ztschr. f. Parasitenk.* 1931. Dec. 4. Vol. 4. No. 1. pp. 140–146. With 3 double plates. [23 refs.]

The distribution and the known provenance of the species of ticks inhabiting the Netherlands East Indies is here collated and elegantly mapped. A. A.

- i. KODAMA (Toshikuni). **On a Certain Mite belonging to Tyroglyphidae found in Human Excreta and its Eggs.**—*Jl. Public Health Assoc. Japan.* 1931. Oct. Vol. 7. No. 10. pp. 1–2.
- ii. —. **On a Certain Mite belonging to Tyroglyphidae found in Human Excreta and its Eggs (Abstract).** (Supplement to an Article under Same Heading in the October Number.)—*Ibid.* 1932. Feb. Vol. 8. No. 2. pp. 5–6.

i. This common foodmite and its eggs were found in the faeces of 6 of 645 school-children and also several times in those of a two-year-old.

Whatever its species it is said that its eggs could hatch after soaking for more than a fortnight in 10 per cent. formalin solution, the larvae sometimes living for a few hours afterwards.

ii. In this supplementary note it is stated that the same mite and its eggs have been detected in the faeces of 25 out of about 2,000 factory hands examined; also that the female mites are still living and producing eggs after 83 days in a suspension of faeces. A. A.

BONNET (P.). Quelques renseignements sur la biologie de *Lebistes reticulatus* Peters, poissons larvivores de la Guadeloupe. [Notes on the Biology of *Lebistes reticulatus* Larvivoracious Fishes of Guadeloupe.]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 248–251.

Lebistes reticulatus is a West Indian species of Cyprinodont fishes commonly known as "millions." The present author observing it in Guadeloupe, states that it can live both in running water and in stagnant water fearfully polluted with organic matter, and even in old salt-works, feeding at the surface but not in deep water. [In these respects it is far from singular among the Cyprinodont fishes.]

A. A.

COULON (G.) & SAUTET (J.). *Gambusia holbrooki* et paludisme en Corse. Résultats de six années de lutte antilarvaire au moyen des poissons culiciphages. [*Gambusia holbrooki* and Malaria in Corsica. Results of Six Years Antilarva Work.]—*Ann. Parasit. Humaine et Comparée.* 1931. Nov. 1. Vol. 9. No. 6. pp. 530–545. With 8 text figs.

An account (covering six years) of the results of the introduction of the Cyprinodont fish *Gambusia holbrooki* into Corsica for the control of malaria-mosquitoes. [The fish is a typical Cyprinodont in its equal aptitude for waters that are fresh, or salt, or polluted]. In the fresh waters of Corsica its only possible fish-enemies are trout, eel, and blenny, and among other possible foes a *Dytiscus* beetle, a *Notonectes* bug, a water leech and the frog have been observed; but none of them prevail against it. In brackish waters communicating with the sea it is pursued by the sea-bass [a perciform fish] and its numbers reduced. But in general it may be said to find in the littoral region and in the low valleys of Corsica conditions extremely favourable for its existence. Of the anti-larval value of *Gambusia* in various places in Corsica this paper gives remarkable testimony; "but has paludism regressed in the regions that have benefited so much by the anti-larval prowess" is a question to which "unfortunately it is impossible to give a precise answer."

In introducing *Gambusia* all waters should be stocked, and be re-stocked again and again if necessary, especially in autumn or in early spring in the case of mosquito-waters that have evaporated unduly in the summer. In the spring time also such waters should be treated with Paris green or with petroleum which are not hurtful to the fish. A. A.

GUDGER (E. W.). On the Alleged Penetration of the Human Urethra by an Amazonian Catfish called *Candiru* with a Review of the Allied Habits of Other Members of the Family Pygidiidae. Parts I & II.—*Amer. Jl. Surgery*. 1930. Jan. & Feb. Vol. 8. Nos. 1 & 2. pp. 170-188; 443-457. With 17 text figs. [41 refs.]

This is a long and interesting story about the small catfishes of the Amazon and its tributaries called *candiru* by the Indians and *canero* by others [and briefly attended to in modern text-books of zoology as "Stegophilus and Vandellia, small fishes from Brazil, the latter are said to ascend the urethra of persons bathing; but there is no doubt that they enter the gill-cavity of larger fishes]. The story begins about a hundred years ago, and those who wish to follow it should read this paper. It opens with MARTINS (1829 and 1831) and the statement that "the things told of this [*candiru*] sound so unusual that I myself am almost afraid to relate them."

The things told by the Indians were that this *candiru* is strangely attracted by the smell of human secretions, and particularly of urine and will enter "with great impetuosity and rapidity" the natural gates and alleys of the perineal region of men and women bathers in the river—even the urethra of the male where it may attach itself and may lead to most painful and dangerous accidents in attempts at its extraction. So real is their fear of the *candiru* that when bathing in the river the Indians take very good care not to pass water, the men ligaturing the prepuce. These Indian stories were confirmed by Dr. LACERDA, a well known naturalist and physician of the day, in Pará. Such is the gist of the story, which from the verified reality of the native bathers' fear and their lively concern in protecting the threatened parts of the body, one cannot treat with contempt. One great difficulty in investigation is that there are many aquatic things besides mysterious fishes that may injure bathers, and in Amazon waters there are certain specific fishes small as well as large that are notorious for their bold ferocity in attacking men and even horses; moreover one of these large fishes is spoken of as *candiru da cavallo*; mutilations and scars well-attested to be due to such rapacious fishes must be distinguished from the insinuating operations of the *candiru*.

We may take to begin with the first-hand observations and experience of those who have seen a *candiru* (or *canero*) taken from one of the privy passages. POEPPING himself (circ. 1836) witnessed a case where penetration of the vagina by a *canero* caused such frightful pain and loss of blood that the woman was "given up to die." Dr. CASTRO of Pará (quoted by JOBERT) wrote "I have myself extracted from the urethra of a negress a little *candiru* which had penetrated during micturition, while bathing in the river; the patient experienced cruel suffering since I had to drag the animal out," with difficulty and laceration. LA COINTE of Pará had personal knowledge of three cases of penetration of the natural openings by a *candiru*, and he describes a vaginal case treated by him and the difficulties and haemorrhage of extraction. Dr. DA MATTA of Manaus describes another vaginal case. Dr. AMMERMAN, U.S.N., testifies that when on the Madeira river he operated two or three times for *candiru*, and that in one male case the fish had penetrated by way of the urethra into the bladder whence it was extracted by suprapubic cystotomy. Besides this ocular testimony there is the statement of Dr. CAMPOS of Pará that he had a lady patient who told him that she had suffered from the extraction of a *candiru* from the vagina; and that of PEARSON who was told by a friend that

his wife when washing in a river had heard the sudden shrieks of a companion assaulted by a *candiru* and had witnessed the painful difficulty and the haemorrhage of its extraction. Such is the positive evidence, given mainly by medical men, and it supports the Indians' story. What has to be noticed about this evidence is the secrecy of the *candiru*'s attack, the facts that it goes for definite openings in a particular region of the body and sticks very fast where it lodges, and the inordinate haemorrhage attending its removal.

Indian stories that the small Pygidoid catfishes known as *candirus* may enter the male urethra and may even get into the male bladder, as well as into the urinogenital passages of the female, with something that looks remarkably like intention, receive support from the circumstantial evidence collected by the author. This evidence shows that in this section of the catfish family there are some truly endoparasitic species that live in the gill-chambers of large fishes and feed on their blood, other species that burrow through the body-wall of large fishes for the same purpose, and still other species that firmly attach themselves temporarily to other fishes (or to other aquatic animals) for their fill. These ectoparasitic and truly endoparasitic Pygidoid catfishes have certain common features, namely combs or patches of retrorse spines on the gill-covers to act as grapnels, and a suctional mouth with teeth formed and arranged for scarification—all this being apparatus for holding fast and for drawing and sucking blood—also a somewhat elongate and slender body and a short straight stomach and gut. It is among these endoparasitic and ectoparasitic and casually parasitic Pygidoid kindred that the author, following EIGENMANN, seems inclined to locate the *candiru*; [but whether he would refer them to any known parasitic species, or would think that some of Nature's journeymen had made them for such, and not made them well, is not yet quite clear.] A. A.

BAKER (C. E.). **Microscopic Examination for Intestinal Parasites of 73 Boys in the National Training School for Boys, Washington, D.C.**—*Public Health Rep.* 1931. Dec. 11. Vol. 46. No. 50. pp. 2980–2983.

Examination of 73 boys in the National Training School, Washington. They came from 17 different States, mostly from Southern States. Fifty-six were infested; only those from California (1) and Colombia (2) were free; 24 infestations were simple, 18 double, 7 triple, 5 quadruple, 1 quintuple, 1 six-fold. An entamoeba cyst was found under the nail of a boy employed in the kitchen of an officers' mess. The parasites found were *E. coli* in 25, *E. histolytica* in 6, *Endolimax nana* in 16, *Iodamoeba williamsi* in 1, unidentified cysts in 2, *Chilomastix mesnili* in 3, *Giardia lamblia* in 11, *Hymenolepis nana* in 7, *Necator americanus* in 25, *Ascaris lumbricoides* in 3, *Trichuris trichiura* in 10, *Strongyloides stercoralis* in 2, ovum of free nematode in 1. A. A.

ARTHUS (Maurice). Les anavenins. (Cinquième Mémoire.) 1. Equivalence des venins et des anavenins. 2. Amphibolie. [Anavenins. (Fifth Memoir.) 1. Equivalence of Venoms and Anavenins. 2. Amphiboly.]—*Jl. Physiol. et Path. Gén.* 1931. Sept. Vol. 29. No. 3. pp. 462–477.

[For notice of the author's earlier papers on this subject see this *Bulletin* Vol. 28, pp. 549, 550, and Vol. 29, p. 161. This seems to be the philosophic conclusion, or distillation, of this very interesting series.]

Venoms and their corresponding antivenins, equally effectual in provoking and perfecting immunity in rabbits, are equally effectual in producing in that animal a state of anaphylaxy and in inciting equally intense anaphylactic crises in the anaphylactised animal. In effect, animals that have undergone the process of immunization against a venom are at one and the same time immunized to the specific toxic effects and anaphylactized to the proteo-toxic effects. This state of anaphylaxy-immunity the author names amphiboly [$\alpha\mu\phi\beta\omicron\lambda\omicron\varsigma$ = hitting both-ways]. In this state of amphiboly immunity is signalized in the magnified minimum lethal dose of the venom, and anaphylaxy is indicated by the exaggerated sensibility to the proteo-toxins. Antivenomous serums are thus amphibolistic serums apt to excite passive amphiboly in animals into which they are injected; they are thus in the very likeness of the animals by which they are equipped.

A. A.

KOPSTEIN (Felix). *Bungarus javanicus*, een nieuwe Javaansche giftslang. Mededeeling over een doodelijke Bungarus beet. [*Bungarus javanicus*, a New Species of Poisonous Snake in Java. A Fatal Case of Its Bite.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. Feb. 2. Vol. 72. No. 3. pp. 136–139. With 1 plate & 1 text fig.

Two men, bitten by the snake in question, died respectively within half-an-hour and within 16 hours after the bite, the most prominent symptom apparently being dyspnoea.

The snake is a hitherto undescribed species, labelled by the author *Bungarus javanicus*. The back is bluish black with numerous gray white spots. The ventral side is more or less white, the abdominal shields with dark corners.

W. J. Bais.

SPENCER (H. A.). *Scorpion and Insect Stings*.—*South African Med. Jl.* 1932. Mar. 12. Vol. 6. No. 5. pp. 157–158.

The author has found the old-established local application of solution of ammonia or of borax to give immediate relief to the pain caused by stings of scorpions, hornets, bees, etc.

A. A.

WIGGLESWORTH (V. B.). *Haematin in the Tracheae of Blood-sucking Insects: an Artefact*.—*Parasitology*. 1931. Nov. Vol. 23. No. 4. pp. 441–442.

“The entry of blood pigment into the tracheal system after a large meal, previously described in *Glossina*, has been shown to be an artefact of fixation.”

A. A.

EPSTEIN (B.). *Scorpion Stings*.—*Jl. Med. Assoc. South Africa*. 1931. Dec. 12. Vol. 5. No. 23. pp. 784–785.

EVANS (A. M.). A New Subspecies of *Anopheles funestus* Giles, from Southern Rhodesia.—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 545–549.

- HASE (Albrecht). Ueber Lebensbedingungen, Verhalten und Fruchtbarkeit der tropischen Hauswanze *Cimex rotundatus* Sign. (*Hex. Rhynch.*) in Venezuela. Beiträge zur experimentellen Parasitologie 7.—*Ztschr. f. Parasitenk.* 1931. Aug. 28. Vol. 3. No. 4. pp. 837–893. With 11 text figs. [3 pages of refs.]
- LALLEMANT (G. F. H. Avé), SOERONO (M.) & SOEKARIA (M. S.). Experiments about the Flying Radius of Some Anopheles. (First Communication.)—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1931. Vol. 20. Pt. 1. pp. 12–25. With 1 map & 1 graph. [11 refs.]
- MARTINI (E.). Die Rassenfrage bei *Anopheles maculipennis*. Ein kritisches Sammelreferat.—*Arch. f. Schiffs- u. Trop. Hyg.* 1931. Dec. Vol. 35. No. 12. pp. 707–733. [5 pages of refs.]
- MILELLA (Alberto). Protozoi intestinali patogeni nelle Puglie.—*Pathologica*. 1932. Mar. 15. Vol. 24. No. 485. pp. 184–185. [13 refs.] English summary (8 lines).
- OBITZ (Kurt). Ueber die Fütterungsinfektion wilder Ratten (*Mus decumanus* Pall.) mit *Balanitidium coli*-Cysten vom Schweine.—*Ztschr. f. Parasitenk.* 1931. Aug. 28. Vol. 3. No. 4. pp. 649–653.
- SALEM (Hassan Hilmy). Some Observations on the Structure of the Mouth Parts and Fore-Intestine of the Fourth Stage Larva of *Aedes (Stegomyia) fasciata* (Fab.).—*Ann. Trop. Med. & Parasit.* 1931. Dec. 31. Vol. 25. Nos. 3 & 4. pp. 393–419. With 14 text figs. [22 refs.]
- SOESILO (R.) & VAN SLOOTEN (J.). Miscellaneous Notes on Anopheline Mosquitoes in the Dutch East Indies.—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1931. Vol. 20. Pt. 2. pp. 124–128. With 7 text figs.
- TANABE (Misao) & KUWABARA (Naonori). Studies on the Growth of *Entamoeba coli* in Vitro.—*Keijo J. of Med.* 1931. June 30. Vol. 2. No. 2. pp. 35–43 (199–207). [12 refs.]
- TOUMANOFF (C.) & FARINAUD (E.). Note sur une prospection entomologique à Chapa. Présence de deux espèces anophéliennes jusqu'ici méconnues en Indochine: *T. Lindesayi* Giles et *A. Gigas* var. *baileyi* Edw.—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 245–247.
- VELLARD (J.) & VIANNA (M. Miguelote). Acção hemolytica dos principaes venenos ophidicos em presença de soros normaes.—*Rev. Med.-Cirurg. do Brasil*. 1931. Sept. Vol. 39. No. 9. pp. 293–329; 1932. Jan. Vol. 40. No. 1. pp. 11–27.
- WALTER (Elizabeth). Protozoos y gusanos intestinales en la poblacion infantil de Torrelavega (Santander).—*Medicina Paises Calidos*. Madrid. 1931. Nov. Vol. 4. No. 6. pp. 502–514. With 1 text fig.

KALA AZAR.

NAPIER (L. Everard) & KRISHNAN (K. V.). **A Theory of the Aetiology and Epidemiology of Kala-Azar in India.**—*Indian Med. Gaz.* 1931. Nov. Vol. 66. No. 11. pp. 603-609. With 1 graph in text. [36 refs.]

In this article the authors introduce a new theory of the epidemiology of kala azar in India which has arisen from the fact that dermal infections with the parasite of the disease are common and probably increasing in Bengal, while they are rare in Assam. The explanation is that in Assam the disease occurs in acute form in epidemic waves, the population losing in the intervening periods any immunity it may have acquired, while in Bengal the disease has been present for many years in endemic form maintaining in the inhabitants a steady immunity which tends to eradicate any visceral invasion of the parasite. It is assumed that in both places the parasite is introduced into the skin, presumably by the sand-fly, and finds there a nidus of reticulo-endothelial cells in which to multiply secure from any serious immunological interference. The onset of some disease, such as malaria or typhoid fever, brings about a mobilization of the infected large mononuclear cells with the consequent distribution of parasites throughout the viscera and other parts of the skin. Where there is no immunity, as in Assam, kala azar results, whereas in Bengal the visceral infection will in many cases fail to become established or be kept in abeyance. The parasites distributed throughout the skin in Bengal ultimately produce cutaneous lesions, but in Assam the visceral infection kills its victim. In addition it is assumed that in Bengal the parasite has become more adapted to a cutaneous habitat and when taken up by the sand-fly from the skin will, when injected, survive more readily in the skin than in the viscera, the converse being the case in Assam where the sand-fly ingests the visceral parasites which appear in the circulating blood and which when reinjected by the sand-fly are more adapted to a survival in the viscera. In Assam the parasite has not undergone the evolutionary development and in consequence dermal lesions are uncommon.

The authors do not discuss the effect of treatment in Assam and Bengal save to remark that they believe that treatment only acts by stimulating immunity response. It is well known that in Bengal cases of kala azar occur and are cured by treatment of their visceral infections, but not always of the cutaneous ones, for not infrequently generalized skin lesions due to the parasite appear a year or two later. The same treatment cures visceral infections in Assam yet subsequent cutaneous lesions do not occur. In both cases the authors assume that the parasites when first introduced remain at a single focus in the skin and are distributed by what they term the mobilization of large mononuclears brought about by some other infection. Are we to assume that in Assam the parasites distributed to the skin by this mobilization do not survive as they do in Bengal, or that they are more readily destroyed by treatment? If in Assam the parasites are able to survive locally in the skin when first introduced why not after their general distribution? Their answer appears to be that in Assam the immunity response on the part of the host is greater than in Bengal. The theory is undoubtedly a very interesting one and is clearly discussed, the evidence supporting each statement being given in a series of footnotes.

C. M. Wenyon.

WENYON (C. M.). **The Transmission of Leishmania Infections. A Review.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 319–348. With 3 figs. [137 refs.]

Dr. Wenyon writes a full and clear review of this in some ways perplexing subject which he unravels as far as is at the moment possible.

He considers direct infection, concluding that the flagellate stage of leishmania can have no satisfactory explanation except in association with some insect or other invertebrate; the bed bug theory; the dog tick theory; the flea theory; and lastly the sandfly theory; and concludes as follows:—

“ All the experiments described above have been attempts to transmit kala-azar or oriental sore by the bite of infected sandflies and it must be admitted that the hopes raised by the discovery of the remarkable development of leishmania in sandflies have not been realised. It was supposed that given a susceptible animal transmission by the bite would be easily accomplished. This has not been the case, so that if the theory of sandfly transmission of these diseases is not to be abandoned, which it seems unreasonable to do, it has to be assumed that some fundamental factor in all these experiments has been omitted or that infection may take place otherwise than by the bite. ADLER (1929), in an analysis of the leishmania sandfly problem, lays stress on the fact that in the Mediterranean area very young children and dogs suffer from kala-azar whereas in India and North China human beings who contract the disease are generally older while dogs are not infected. He sees in this an indication that in India and North China infection may be acquired by the crushing of infected sandflies on the skin whereas in the Mediterranean area the method of infection is by the bite, as very young children and dogs are unlikely to crush these insects. Similarly in Bagdad human beings and dogs commonly suffer from oriental sore while in Palestine infection in dogs does not occur. The inference is that in Bagdad infection is by the bite and in Palestine by crushing. In support of this it is stated that the development of *L. tropica* is more marked in *P. sergenti* of Bagdad than in *P. papatasi* of Palestine. KNOWLES (1927) has suggested that in endemic areas in India there may be very extensive inoculation of the population with leishmania by the sandfly but that in only certain cases of lowered resistance will infection take place, as for instance after typhoid fever or malaria. Whatever may be the explanation of the difficulties encountered in effecting transmission by the sandfly, there is abundant evidence, apart from the specific development of the parasite in these insects, that they are associated with the diseases. In India it was SINTON's observation that the distribution of *P. argentipes* in India coincided with that of kala-azar that led KNOWLES, NAPIER and SMITH to make the outstanding discovery in connection with its transmission. NAPIER (1925) in a study of environment associated with kala-azar in Calcutta concluded that the evidence was in favour of the sandfly being the transmitter of the disease, while more recently the same observer (1931) in an epidemiological investigation of kala-azar in a rural area in Bengal found that all the data secured fitted into the hypothesis that *P. argentipes* was the vector. In North China again kala-azar is limited almost entirely to areas north of the Yangtse and nothing is known of sandflies south of this river. MORRIS (1931) has reported one case from Sungkiang fifteen miles south west of Shanghai. ADLER and THEODOR (1931*b*) point out that in Italy the distribution of *P. perniciosus* and kala-azar are identical. In Catania it is significant that both this sandfly and kala-azar are rare at the centre of the town while the absence of the sandfly and kala-azar above a certain altitude even in the centre of endemic foci is in favour of this particular species being the vector. As regards oriental sore wherever it occurs sandflies are common though it cannot be asserted that the converse is true. Epidemiological evidence such as this could be multiplied but though much of it does not

definitely incriminate the sandfly in no case can it be said to have refuted the theory of sandfly transmission.

"It may be that infection results from the ingestion of infected sandflies or the crushing of them on the skin but neither of these methods would account for the anterior development, which is much more suggestive of infection through the bite. In the light of NAPIER and KRISHNAN'S (1931) statements regarding dermal leishmaniasis in Bengal it seems possible that in kala-azar, as also in oriental sore, a primary local skin infection, perhaps not detectable, may be produced by the bite of an infected sandfly and that in only certain cases or when the parasite is particularly virulent is natural kala-azar produced by generalisation of the infection. ROW (1912) proved that in the monkey a purely local lesion might result from the inoculation of *L. donovani* in the skin, while KORKK (1914) confirmed this observation but pointed out that in some cases a generalised infection might result and in others both a local lesion and a generalised infection. SHORTT and SWAMINATH (1926) inoculated a monkey intradermally with *L. donovani* and discovered parasites in the internal organs one year later.

"It is evident that the problem has not yet been completely solved but the fact that in one or two cases transmission by the bite of the sandfly has been effected, that there is undoubtedly a specific relationship between leishmania and these insects in the light of the remarkable development that takes place, that the flagellates in the sandfly are virulent and are known to escape from the proboscis during feeding, afford overwhelming evidence that sandflies are responsible for the spread of the two diseases kala-azar and oriental sore."

A list of 137 references is appended.

A. G. B.

MORRIS (H. H.). **Kala-Azar from Southern Kiangsu.**—*China Med. Jl.* 1931. Dec. Vol. 45. No. 12. pp. 1180–1181.

The case reported is of interest in that the patient made repeated statements that he had never been more than a few miles from Sungkiang, a small town on the Hangchow-Shanghai Railway, some fifteen miles south-west of Shanghai. Thus, for the first time, extending the area of kala azar in China to a district south of the Yangtse.

C. M. W.

CANAAN (T.). Ein kasuistisch-geographischer Beitrag zur Kala-azar. [K.A. : Distribution.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Dec. Vol. 35. No. 12. pp. 706–707.

The author records the first case of kala azar from Palestine in a child 4½ years of age who had always lived in the Mohammedan village of Beit Ikksa, north-west of Jerusalem.

C. M. W.

DE LA CAMARA (Pedro). Leishmaniosis y *Phlebotomus*. [**Leishmaniasis and Phlebotomus.**]—*Medicina Paises Calidos*. Madrid. 1932. Mar. Vol. 5. No. 2. pp. 81–123. With 8 text figs. [150 refs.] French summary.

The paper is a lengthy discussion of published work on the question of the transmission of leishmaniasis by blood-sucking arthropoda, chiefly sandflies. A list of 150 references is given.

C. M. W.

BROC. La rate dans le kala-azar de la première enfance. [**The Spleen in K.A. of Young Children.**—*Tunisie Méd.* 1931. Sept.-Oct. Vol. 25. No. 8. pp. 432-434.]

That marked enlargement of the spleen does not always occur in kala azar is illustrated by the author in reference to five cases in young children in which the spleen, even in an advanced stage of the disease, did not extend below the costal margin for more than one to two fingers' breadth. Since in Tunis this degree of enlargement due to other causes is of common occurrence, errors in diagnosis are liable to occur, as in one of the cases reported in which the nature of the illness was not realised till it was too late for treatment. It is evident that in endemic centres of kala azar a febrile anaemia associated with a moderate enlargement of the spleen which does not respond to quinine should be regarded as possibly due to kala azar. C. M. W.

SALA GINABREDA (José M.). El valor pronóstico de la punción del bazo en el kala-azar. [**Prognostic Value of Spleen Puncture in K.A.**]—*Rev. Méd. Barcelona.* 1932. Mar. Vol. 17. No. 99. pp. 205-218. With 10 charts. [13 refs.]

The view is expressed that in cases of kala azar the appearance of the films made from blood obtained by spleen puncture affords some indication of the severity of the case. In some cases the films resemble those from splenomegaly of a benign type. The leucocytes are reduced in number, there being one to each hundred or two hundred red blood corpuscles. Of the leucocytes present, the majority are lymphocytes or mononuclears, the monocytes being scanty. Few leishmania are present. Such cases are benign in nature, respond rapidly to treatment and are not subject to complications. In other cases the films show numerous parasites and an intense leucocytosis with abundant monocytes. In these cases complications are frequent and the prognosis is bad. C. M. W.

CORONA (Franco). Nuovo contributo allo studio del kala-azar dell'adulto. [**Kala Azar in the Adult.**]—*Riforma Med.* 1931. Nov. 16. Vol. 47. No. 46. pp. 1735-1739.

The author, after reviewing the previous records of cases of kala azar in adults in Italy including eight cases reported by himself from Palermo during the three years 1927-1929, describes in detail four further cases in individuals varying in age from 15 to 27, which have since come to his notice in the same province. C. M. W.

OELSNITZ & LIOTARD (M.). Le diagnostic et le traitement de la leishmaniose viscérale. A propos d'un cas de kala-azar méditerranéen de l'adulte suivi de guérison. [**Case of K.A. in Adult: Recovery.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Feb. 8. 48th Year. 3rd Ser. No. 4. pp. 126-141. With 2 text figs. [Refs. in footnotes.]

A detailed account of a case of kala azar in an adult and its successful treatment in the South of France. Two other cases, both fatal, seen by the authors in adults in France are mentioned, but it is not clear in any one where the disease was contracted, though if not in the South of France a very long history has to be admitted. C. M. W.

ABRAMI (P.), GRÉGOIRE & WALLICH (Robert). Un cas de kala-azar autochtone de l'adulte : splénectomie, guérison. [Case of K. A. in an Adult.]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1931. Nov. 30. 47th Year. 3rd Ser. No. 32. pp. 1783-1787.

A woman, thirty-five years of age, who for the past ten years had been in no countries but France, England and Germany, was, after long delay in diagnosis owing to a previous history of malaria, discovered to be suffering from kala azar. It is concluded that the disease was contracted in France, the Mediterranean littoral of which is known to be an endemic area. Owing to the advanced stage of the disease, splenectomy was performed and on the following day 10 centigrams of stibenyl were administered. This was followed by a course of neostibosan consisting of two doses of 0.2 gm. and eight doses of 0.3 gm. given on alternate days. Though the leucocyte count had returned to normal within eighteen days of the operation, the patient remained very anaemic in spite of treatment with liver extract and a diet rich in vitamins. Accordingly on the nineteenth day 200 cc. of blood were transfused. From this time improvement was continuous. About a month later a supplementary course of ten doses of neostibosan was given. A complete recovery resulted. C. M. W.

HERRERO RUBIO (Pedro). Tres casos de gran esplenomegalia infantil relacionados con leishmaniosis ; efectos del neoestibosan en el tratamiento. [Three Cases of Infantile Splenomegaly, One due to Leishmaniasis.]—*Medicina Paises Calidos*. Madrid. 1932. Mar. Vol. 5. No. 2. pp. 154-162. With 3 text figs.

The author describes three cases of splenomegaly in young children of Alicante in Spain. Spleen puncture revealed leishmania in one of them only, but all three were treated with neostibosan. The case in which leishmania had been found and one of the others improved with treatment and were clinically cured but the other case did not respond, the conclusion being finally reached that it was some form of malignant tumour. C. M. W.

MARQUÉZY (R. A.), MONNIER & BORRIEN (H.). Un cas de kala-azar infantile observé dans la région parisienne. Guérison depuis cinq ans. Remarques sur la durée de l'incubation. [Case of K.A. seen 5 Years after Recovery.]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1931. Dec. 14. 47th Year. 3rd Ser. No. 34. pp. 1862-1865.

A record of a case of kala azar in a young boy seen by the authors in 1926 in Paris. The disease was contracted either at La Napoule or Grasse in the South of France. Treatment occupying three months was carried out with intravenous tartar emetic and stibyl, and later by intramuscular injections of stibenyl. A complete cure resulted, the child having remained in good health. C. M. W.

CHAHED (Laroussi). Un cas de kala-azar chez un enfant musulman. [K.A. in a Mussulman Child.]—*Tunisie Méd.* 1931. Sept.-Oct. Vol. 25. No. 8. pp. 435-436. With 1 chart in text.

Record of a fatal case of kala-azar in an Arab child in Tunis, in which diagnosis was made only after death. C. M. W.

- i. RUGGERO & SANTILLANA. Un cas de kala-azar antimonio-résistant. [Treatment of K.A.].—*Tunisie Méd.* 1931. Sept.-Oct. Vol. 25. No. 8. pp. 426-427.
- ii. BROC. Le traitement du kala-azar par le néostibosane.—*Ibid.* pp. 428-431.

i. The record of a case of kala azar in a female child three years of age which has proved resistant to intravenous tartar emetic, intramuscular neostibosan and tartar emetic again. In spite of this treatment the condition is becoming progressively worse.

ii. A record of the treatment of four cases of infantile kala azar by intramuscular injections of neostibosan. Two of the cases made a good recovery but two which were too far advanced died. C. M. W.

NAPIER (L. Everard). **The Pentavalent Compounds of Antimony in the Treatment of Kala-Azar. Part VI. A Comparison of Results with Different Compounds. Part VII. Neostibosan : Di-Ethyl-Amine Para-Amino-Phenyl Stibiate ; 254 Cases.**—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 705-717. With 1 graph in text. [8 refs.]; pp. 719-735. With 2 graphs in text.

During the period 1923 to 1926 five important pentavalent antimony compounds, viz. Stibosan, Bayer 693 (Neostibosan), Aminostiburea, Urea stibamine and Stibamine glucoside, have been used at the Calcutta School of Tropical Medicine for the treatment of kala azar. The results obtained with each drug have already been given in a series of papers (Parts I-V). The object of the present paper (Part VI) is to compare these results with a view to deciding which of the five drugs is the best. The many difficulties associated with such a comparison are indicated and carefully discussed in the paper. As regards cure it is revealed that the only reliable criterion is a history of at least six months' good health after completion of a course of treatment. It appears now that deaths which occurred during treatment are in a sense attributable to the drug in that they would not have occurred so soon if treatment had been withheld. This is especially the case with tartar emetic but though with the pentavalent compounds deaths during treatment are fewer, they have to be taken into account in assessing the value of a drug for they vary with the drug used. Thus, of 104 persons treated with stibosan 11 died during treatment but of 61 treated with neostibosan none died. Other points which are considered are cessation of fever, reduction in the size of the spleen, increase in weight and change in white cell count. The general result arrived at is that the drug Bayer 693 had the highest curative power and was the most suitable for further detailed investigations.

The second paper (Part VII) gives the results of these further investigations with Bayer 693. It is noted that the early batches of the drug were different from the last, which was prepared by a modified process owing to the author's information to the I.G. that the early batches sometimes caused vomiting. The last batch was named Bayer 693 B. Though differing slightly in antimony content from the early batches its therapeutic effect appeared to be the same without, however, the production of vomiting. Up to the end of 1928 a series of 254 cases had been treated with one or other of these batches. Examination of the results shows that where large numbers of patients are to be treated actual total doses of 2.25 gm. or relative total doses of 3.0 gm. per kilo

of body weight are the most suitable. To give more would be uneconomical and to give less would mean a distinct increase in the relapse rate. The intravenous injection of 5 per cent. solution would appear to be the method of choice, but there seems to be no reason why a 25 per cent. solution should not be used intravenously or even intramuscularly. As regards the distribution of doses there is no clear indication, but there would appear to be no disadvantage in giving injections daily. It is possible that a course of daily injections for five days (the 5-injection course) may prove to be the most satisfactory, but further evidence on this point is required. To appreciate properly the difficulties of an analysis of the kind given in these papers it is necessary to study them in detail. C. M. W.

LOW (G. Carmichael) & FRANKLIN (R. H.). **New Antimony Preparations in the Treatment of Mediterranean Leishmaniasis and Japanese (or Eastern) Schistosomiasis.**—*Lancet*. 1932. Feb. 20. pp. 395–396.

The first case described is that of a female child three and a half years of age who contracted kala azar in Malta. Treatment with von Heyden 471 (Stibosan) intramuscularly was commenced with a dose of 0.025 gm. Injections were given on alternate days, the dose being increased to 0.05 gm. and then to 0.075 gm. Improvement was not satisfactory and when a total of 0.625 gm. had been administered neo-stibosan intravenously was substituted. The dose was 0.075 gm. given at first on alternate days, and later on every third day. There was immediate response, improvement being striking and rapid. A total of 0.8 gm. was given. The child was discharged cured, and four months later was in good health. The second case reported is that of a man of 29 years suffering from Japanese schistosomiasis. Ten intramuscular injections of neo-antimosan (Fouadin) were given (1 dose of 1.5 cc.; 1 of 3.5 cc.; and 8 of 5 cc.) in the course of thirteen days. A complete cure resulted. C. M. W.

DIKSHIT (B. B.) & RAO (D. Kameshwar). **Antimony Test for Kala-Azar.**—*Indian Jl. Med.* 1931. Dec. Vol. 12. No. 6. pp. 264–267.

When the antimony test for kala azar was described by CHOPRA and his colleagues it was stated that 97 per cent. of kala azar sera gave a positive result and that sera from cases of other diseases were usually negative. As in these tests the control sera were taken from cases in the endemic kala azar area, the authors of the paper under review tested the sera of 100 cases in a non-endemic area. The result was negative in all but 4, one of which proved to be kala azar. Two of the three remaining were cases of pyrexia of short duration, and one a case of dog bite showing no clinical manifestations of rabies. C. M. W.

SEN (N. K.). **The Antimony Test with Sera other than those of Kala-Azar.**—*Malayan Med. Jl.* 1932. Mar. Vol. 7. No. 1. pp. 13–15.

During the year 1931 four cases of kala azar and one of dermal leishmanoid were admitted to the Singapore hospitals. All these cases gave histories of infection outside Malaya—India, China, Malta. As the sera of these cases gave a positive antimony test it was decided to

apply the test to a number of other sera which were available for the Kahn test. The test was carried out by running in to the sera in Dreyer's tubes a 4 per cent. solution of neostibosan in distilled water. Readings were taken in 5 to 10 minutes. If the reaction was positive or doubtfully positive the test was repeated with serum diluted 1 in 10. Of 1,000 undiluted sera tested 7 gave a positive result and 36 a doubtful one. Of the positive sera 6 were still positive on dilution, while of the 36 doubtful ones all but two were completely negative on dilution. There was no relation between the Kahn positive sera and those positive to the antimony test. C. M. W.

ANDRE (Z.). Use of the Photometer "Vernes-Bricq-Yvon" for avoiding Some Causes of Error in the Diagnosis of "Kala-Azar" by the Reaction of Chopra and Gupta's Precipitation.—*Indian Jl. Med.* 1932. Feb. Vol. 13. Pt. 1. pp. 5-6.

By using the "Vernes-Bricq-Yvon" photometer, the author has found that it is possible to detect the opalescence produced in kala azar serum by the addition of urea stibamine, as in the Chopra and Gupta test when the serum is diluted to 1 in 1,000. Even in this dilution serum from cases of other diseases (1 leprosy, 1 chronic rheumatism) may reveal a slight opalescence. However, if with serum of this dilution an increase of optic density greater than 15° is obtained it can be assumed that the patient is suffering from kala azar. The test is carried out by introducing into each of two tubes 1 cc. of the diluted serum and adding to one tube 0.1 cc. of a 1 per cent. solution of urea stibamine. C. M. W.

SALLE (A. J.). The Metabolism of Protozoa. II. A New Solid and a New Liquid Medium for the Cultivation of *Leishmania donovani*. III. The Metabolism of *Leishmania donovani*.—*Jl. Infect. Dis.* 1931. Dec. Vol. 49. No. 6. pp. 473-480. [18 refs.]; 481-484. [13 refs.]

With a view to studying the metabolism of *Leishmania donovani* in culture media, experiments were first made to discover the media in which the parasites would grow best. As a solid medium the following was found to yield massive quantities of organisms for inoculation into liquid media and for the preparation of immune sera.

Peptone (Difco) 20 gm., beef infusion 250 cc., salt 5 gm., agar 15 gm. and distilled water to make 830 cc. are boiled to dissolve the agar. Water is added to replace loss by evaporation, and the reaction is adjusted to pH 7.2. The agar base is distributed into flasks (83 cc. to each flask) and sterilized in the autoclave. When required, to one flask is added 2 cc. of sterile 50 per cent. dextrose solution and the agar is melted. When cooled to 50°C. 15 cc. of defibrinated rabbit blood is added and the mixture distributed in test tubes to solidify as slopes. On the surface of this medium in five or six days at 22°C. massive quantities of organisms are obtained. The liquid medium is composed of peptone 20 gm., beef infusion 250 cc., salt 5 gm., dextrose 10 gm. and distilled water to make 550 cc. The reaction is adjusted to pH 7.2 with sodium hydroxide. To this mixture is added a mixture of 300 cc. of distilled water and 150 cc. of defibrinated rabbit's blood which has been allowed to stand till complete haemolysis has taken place. The resulting 1,000 cc. of medium is centrifuged till clear and sterilized by filtration through Seitz or Berkefeld filters. The medium should be used in a shallow layer at the bottom of a flask.

The metabolic studies were carried out with *L. donovani* grown in the liquid medium with or without sugar. In the absence of sugar there is a great increase in the ammonia nitrogen fraction and in the pH value in the medium. In the presence of dextrose there is a minimum of activity in the nitrogenous constituents of the medium, showing that for purposes of energy the organisms prefer carbohydrates to proteins. C. M. W.

HOFFMANN (J. M.) & SCHULTSZ (Th. W.). Züchtung eines frisch isolierten Kala-azar-Stammes auf NNN.—Agar und auf Blutplatten. [**Cultivation of a Freshly Isolated Leishmania Strain.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Dec. Vol. 35. No. 12. pp. 700–705. With 5 text figs. [2 refs.]

Having obtained a freshly isolated culture of leishmania from a case of Indian kala azar, the author followed its behaviour in culture media, particularly on the surface of blood agar in Petri dishes. It was noted that the organism at first grew slowly and produced a large number of rosettes but later, after a number of subcultures, grew more rapidly and formed outgrowths from the inoculation streak, while few rosettes were formed. This alteration in the character of the growth accounts for differences between the descriptions of MAYER and RAY and CHRISTOPHERS, SHORTT and BARRAUD; the first two having investigated old cultures and the others freshly isolated ones. C. M. W.

TRENSZ (F.). La "sérofloculation palustre" de Henry dans la trypanosomiase caméline et la leishmaniose canine expérimentales. [**Henry's Malaria Test in Experimental Camel Trypanosomiasis and in Canine K.A.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 230–234. With 1 text fig.

HENRY's claim that two types of antibody are produced as a result of two classes of antigen associated with infecting organisms has been tested by the author in experimental trypanosomiasis in guineapigs, and in experimental kala azar in a fox in N. Africa. HENRY states that the malarial parasite causes the production of antigens outside itself (exo-antigens) and at the same time produces others within itself (endo-antigens). To the latter class belongs the yellow pigment and the melanin. These substances give rise to antibodies in the serum, the presence of which can be demonstrated by flocculation tests. HENRY employed as substitutes for these pigments albuminate of iron and choroidal melanin and claimed that he never obtained a positive flocculation reaction in normal subjects, but did so in cases of malaria. The author has found that though the test is negative for normal guineapigs and dogs, the infected animals gave a positive reaction when the substances supposed to be specific for malaria were employed. It thus appears that HENRY's reaction can be given by the serum of animals infected with protozoa which do not produce either ferruginous pigment or melanin. C. M. W.

SALLE (A. J.). **The Electrical Behavior of *Leishmania donovani*.**—*Jl. Infect. Dis.* 1931. Nov. Vol. 49. No. 5. pp. 450–454. [29 refs.]

The author has found that in an electric field the cultural forms of *Leishmania donovani* migrate to the cathode at pH 2.16 and below, and to

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the anode at pH 3.10 and above. The iso-electric point falling between pH 2.16 and 3.10 brings the parasite into line with the great majority of bacteria which have an iso-electric point at about pH 3. C. M. W.

VELU (H.), EYRAUD (E.) & PETITDIDIER. Recherches sur la leishmaniose canine dans la région de Casablanca, et sur la valeur de la formol-gélification comme méthode de diagnostic. [**Researches on Canine K.A. at Casablanca : the Formol-Gel Reaction.**—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 227-230. [14 refs.]]

The formol-gel reaction was performed with the serum of 280 dogs in the district of Casablanca. Forty gave a positive result in 15 minutes to 4 hours. The serum of these 40 dogs was further examined by the antimony test, while cultures and smears were made from the spleen and bone marrow with a view to demonstrating leishmania. The results were quite negative. The failure to discover leishmania and the fact that the serum of four dogs suffering from experimental trypanosomiasis gave a very rapid formol-gel reaction indicate that the test is of little value for the diagnosis of kala azar in dogs. In addition to the dogs mentioned above autopsies were performed on 30 other dogs without finding an infection. C. M. W.

TCHETAEW (N. A.). Réaction de Napier dans la leishmaniose canine. [**The Napier Reaction in Canine Leishmaniasis.**—*Trop. Med. & Vet. Moscow.* 1931. Vol. 9. No. 3. pp. 128-132. [In Russian. French summary.]]

The author applied Napier's formol-gel test to dermal and visceral canine leishmaniasis in Turkestan. There was no reaction or a slight opalescence of the serum in 45 dogs with dermal lesions, and none in control animals. In those with visceral leishmaniasis the solidified serum became opaque in varying degrees. The results were controlled by microscopical examination of the dogs, and the following conclusions were made :—(1) A sharp Napier's reaction indicates the presence of visceral leishmaniasis ; (2) a weak reaction indicates either a slight development or the initial stages of visceral leishmaniasis, or it may point to dermal leishmaniasis. One dog giving a positive reaction, failed to react in the following year though post mortem examination revealed a heavy infection with leishmania. A negative reaction is, therefore, an unreliable indication of the absence of visceral leishmaniasis. The test was applied to 517 wandering dogs rounded up for destruction in 1929. In ten that showed a positive reaction parasites were discovered microscopically. C. A. Hoare.

PARROT (L.), DONATIEN (A.) & LESTOQUARD (F.). Observations nouvelles sur le développement du parasite de la leishmaniose viscérale du chien chez un phlébotome (*Phlebotomus perniciosus*). [**Development of Parasite of Canine K.A. in Phlebotomus.**—*Arch. Inst. Pasteur d'Algérie.* 1931. Sept. Vol. 9. No. 3. pp. 438-441.]

The authors have already shown that the parasite of canine kala azar in Algeria develops in *Phlebotomus perniciosus* (see this *Bulletin*,

Vol. 28, p. 157). In the present paper further observations of the same kind are recorded. Sandflies were collected daily from the kennel of a dog suffering from kala azar and showing various ulcerations about the head and neck. The gorged sand-flies were kept for a few days in a humid atmosphere at laboratory temperature (24°C. to 27°C.) and then dissected. During June there were thus examined 58 sand-flies (10 on the second day; 35 on the third; 9 on the fourth and 4 on the fifth). Of these 14 (4, 6, 3, 1) were found infected with flagellates which showed a tendency to concentration at the anterior part of the stomach. The dog on which the sand-flies had fed was affected with ticks, particularly about the ears. Examination of 12 female ticks failed to reveal any flagellates or leishmania. C. M. W.

ADLER (S.) & THEODOR (O.). **Skin Infection in Canine Visceral Leishmaniasis.** [Memoranda.]—*Brit. Med. Jl.* 1931. Dec. 26. p. 1179.

Examining dogs suffering from kala azar in Malta, the authors have noted that wandering cells infected with leishmania are distributed almost uniformly throughout the intact dermis in all parts of the body, even in animals showing a very slight visceral infection. Sandflies (*Phlebotomus perniciosus*) fed on the intact skin of a dog with slight visceral infection became infected to the extent of 32 per cent. With two other naturally infected dogs, the figures were 62 and 65 per cent. None of these animals had cutaneous ulcers such as have been noted in canine kala azar by several observers. Spleen smears of the dogs showed leishmania, but in much smaller numbers than in spleen smears of average human cases of infantile kala azar, which give a relatively low infection rate with *P. perniciosus*. Blood smears of the dogs did not reveal any leishmania so that it appears probable that sandflies fed on dogs become infected by ingestion of parasites from the skin. In the sandflies the flagellates tend to assume an anterior position and behave as in sand-flies infected with leishmania of human origin.

C. M. W.

MILLS (E. A.) & MACHATTIE (C.) in collaboration with CHADWICK (C. R.). **The Rieckenberg Reaction as an Aid to Diagnosis in Chronic and Aberrant Types of Oriental Sore.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 205–208.

The authors in Baghdad have tested the Rieckenberg reaction in human and canine cases of cutaneous leishmaniasis, and conclude that it is an aid to the diagnosis of chronic and aberrant types of oriental sore in an endemic area, when diagnosis by direct microscopical examination of old lesions is often a matter of considerable difficulty.

C. M. W.

BEHDJET (Houloussi). Die Behandlung und die seltenen Formen der Orientbeule. [**Rare Forms of Oriental Sore: Treatment.**]—*Dermat. Woch.* 1932. Jan. 23. Vol. 94. No. 4. pp. 138–142. With 6 text figs.

Writing from Constantinople the author describes various manifestations of oriental sore and records the fact that the disease can be

contracted there. He reviews a number of different treatments, and gives it as his opinion that diathermy yields the best results in the minimum of time.
C. M. W.

DELAMARE (G.) & GATTI (C.). Fusospirochétose et leishmaniose cutanées. [**Fusospirochaetosis and Dermal Leishmaniasis.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 141-145. With 7 figs. on 2 plates.

The paper describes two cases of muco-cutaneous leishmaniasis in both of which the right foot and the nasal mucosa were involved. In both cases large numbers of spirochaetes and fusiform bacilli were found in the ulcers, and it was noted that this secondary involvement did not give to the lesions the pseudo-membranous or gangrenous character nor the rounded form of a tropical ulcer.
C. M. W.

SORINSON (N. S.). Beitrag zur Frage der Leishmaniasis cutanea. Versuch der Behandlung mit Goldpräparaten. [**Treatment of Dermal Leishmaniasis with Gold Preparations.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Feb. Vol. 36. No. 2. pp. 53-71. [122 refs.]

The author has tested the therapeutic effect of intravenous injection of gold salts (krysolgan and sanocrysin) in cases of oriental sore. The number of injections given was six or seven and the total quantity of drug was 0.26 gm. of krysolgan in one case, 2.5 gm. and 2 gm. of sanocrysin in two cases, and 0.001 gm. of krysolgan with 0.65 of sanocrysin in a fourth case. In a fifth case treatment was in progress. As a complete cure was obtained in seven weeks or less, it is thought that the promising results demand further investigation of this treatment and its possible extension to kala azar.
C. M. W.

SANTOS ZETINA (F.). Un caso de coexistencia de sífilis terciaria con leishmaniosis cutáneomucosa. [**Association of Tertiary Syphilis with Dermal Leishmaniasis.**]—*Rev. Méd. Yucatán.* 1931. Oct. Vol. 16. No. 9. pp. 166-170.

The case described is that of a man with ulceration involving the skin and mucosa of the mouth. A diagnosis of leishmaniasis and tertiary syphilis was made. The case failed to respond to arsenical treatment, but did so rapidly to injections of stibial (2 per cent. solution of sodium antimony tartrate).
C. M. W.

CODAZZI AGUIRRE (J. A.). Denuncia de la presencia de leishmaniosis tegumentaria americana en el Norte santafecino. [**Dermal Leishmaniasis in Santa Fé.**]—*Semana Méd.* 1932. Jan. 21. Vol. 39. No. 3 (1984). pp. 245-247. With 1 text fig.

A record of two cases of cutaneous leishmaniasis in the North of the Province of Santa Fé in the Argentine.
C. M. W.

MARMO (Achille). Contributo alla leishmaniosi esterna. [**Oriental Sore.**]—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 215–223. With 5 text figs. English summary (6 lines). [47 refs.]

An account of two cases of oriental sore from Asmara, Eritrea.

C. M. W.

DA CUNHA (Aristides Marques). Diagnostic de la leishmaniose tégumentaire par déviation du complément et intradermo-réaction.—*C. R. Soc. Biol.* 1931. Dec. 18. Vol. 108. No. 37. pp. 1076–1078.

A French version of the Portuguese paper reviewed in this *Bulletin*, Vol. 28, p. 646.

C. M. W.

BROC, Revue critique sur le kala-azar.—*Tunisie Méd.* 1931. Sept.-Oct. Vol. 25. No. 8. pp. 417–425. [15 refs.]

JEAUME (G.). Un cas de leishmaniose naturelle généralisée chez le chien au Maroc.—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 225–227. With 1 text fig.

PINELLI (Anna). Il primo caso di leishmaniosi infantile a Catanzaro.—*Pediatria.* 1932. Feb. 1. Vol. 40. No. 3. pp. 147–150.

SCATURRO (Alberto). La leishmaniosi interna (kala-azar).—*Policlinico. Sez. Prat.* 1932. Feb. 29. Vol. 39. No. 9. pp. 331–334. [22 refs.]

MISCELLANEOUS.

FISCHER (Otto). Studien zur Pathologie und Epidemiologie Ost-Afrikas. Beobachtungen und Untersuchungen im Mandatsgebiet Tanganyika (Deutsch-Ost-Afrika). [*Pathological and Epidemiological Studies in Tanganyika Territory.*—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Vol. 36. No. 1. pp. 1-104 (1-104). With 49 text figs.

The investigations here recorded were made in Tanganyika Mandated Territory, formerly German East Africa, in 1928-1930, and are set out in three chapters. The first contains notes on the geography and climate (4 pp.), the second deals briefly with the composition of the population, and birth and death rates (8 pp.), while the third, comprising the remainder of the paper, is devoted to the pathological conditions found, which are discussed under the headings A, Tropical and B, Non-tropical. In A, the following diseases are considered:—Malaria (9 pp.), sleeping sickness (7 pp.), leprosy (5 pp.), framboesia (including gangosa, goundou and juxta-articular nodules) (8 pp.), helminth infections (bilharziasis, intestinal helminthiasis and filariasis) (8 pp.); relapsing fever, leishmaniasis, smallpox and tropical ulcer each occupy one page, and three pages are devoted to rarer types of disease.

In B, there are two parts, viz.—I. *General infectious diseases*, under which heading children's diseases such as whooping-cough, measles, chicken-pox, mumps, scarlet fever and diphtheria are briefly discussed. Tuberculosis occupies 6 pages; venereal disease, influenza, pneumonia, typhus, dysentery, rheumatic polyarthritis, anthrax, cerebro-spinal meningitis, poliomyelitis, tetanus and diseases of the eyes, each have a page or less allotted to them.

II. *Non-infectious diseases* are treated in four short sections as follows:—(a) Tumours, non-malignant and malignant (6 pp.); (b) mental diseases (7 pp.); (c) deformities (1 p.) and (d) other non-infectious diseases (2 pp.).

The author discusses the relationship between the Indian and Arab portions of the population and the Bantus, and endeavours to show an association of the mortality among children with such considerations as religion and marriage customs; the adult native death rate, he considers, is small; natives frequently live to a considerable age.

The most frequent disease of the East African is malaria; on the shore of Lake Nyasa the author found, for example, 346 with parasites in 480 children up to 14 years of age. No case of congenital malaria was seen; the blood of new-born children and their mothers was negative; he expresses the view that, immunity having set in about puberty, the mother at her first birth is immune and, "she has no longer parasites in her blood which can pass to the child"; he does not discuss placental blood findings.

He gives percentages for 1929 and 1930 to show that in two regions the incidence of simple tertian and malignant tertian was quite different in the two years at the same season. Crescent carriers in the low-lying country became fewer as the age increased to 14, whereas in the hilly country the number remained high to this age.

With regard to sleeping sickness, the author gives a map showing the distribution before the war, and the present day extent of the disease. It would appear from it that, at the former date, the disease

was on all the borders of the country, i.e., of Kenya, Uganda, Belgian-Congo, Northern Rhodesia, Portuguese East Africa, but only at one point inside Tanganyika Territory, at Liwale; now it is shown as widely extended.

Concerning yaws, the author states that in many districts no person escapes infection, and that the tertiary lesions of it are in no way distinguishable from those of tertiary syphilis. He lumbar-punctured framboesia cases in all stages, "especially those with tertiary signs"; no change in the spinal fluid or in the nervous system was observed in yaws cases. He mentions districts with yaws, others with syphilis predominating, and yet others with each in about equal proportions.

The author has given a certain number of percentages but the totals from which these are derived are not stated. The photographic illustrations are excellent but most of the subjects will be familiar to medical readers who know Central Africa.

B. Blacklock.

i. LEDENTU. Essai de nosographie du Gabon. [**The Diseases of Gabun.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. July-Aug.-Sept. Vol. 29. No. 3. pp. 427-451. With 1 map & 2 diagrams in text.

ii. —. La médecine sociale et l'assistance médicale indigène au Gabon. [**Social Medicine and Native Medical Assistance in Gabun.**]—*Ibid.* pp. 452-479. With 6 diagrams in text.

i. The author comments on the paucity of his data, but puts his paper forward as a first survey.

In 1930 the consultations exceeded 100,000 [population of Gabun, 400,000], nine-tenths of which were "bush" consultations. These are the source of the figures. A table gives for 9 districts the percentages of the chief causes of morbidity according to hospital admissions and other attendances. Trypanosomiasis, for reasons stated, is excluded. Epidemic diseases make little show. Neither plague nor yellow fever occurs partly owing to the bad anchorage of the ports which prevents vessels from approaching very near the shore. Variola has not been seen for some years [but the presence of alastrim is mentioned.] Cerebrospinal meningitis has not been recorded since 1922. Of endemic diseases yaws figures with most frequency, representing 14 per cent. of the general morbidity, but the author justly points out that the success of modern treatment of yaws brings the natives in numbers and from great distances. Malaria represents 5.5 per cent. Amoebic dysentery, says the author, accounted for deadly epidemics in which 170 persons died out of 400. [The possibility of these having been bacillary dysentery is not discussed.] Beri beri formed 1 per cent. of the general morbidity. The frequency of leprosy is unknown and here the position is the reverse of that in yaws; treatment is such a long process that the native is little attracted. It is more common on the coast than in the interior. Filariasis ("*Filaria loa*") affects 80 to 85 per cent. of the population; it is a rare cause of morbidity. A form of epidemic diarrhoea, attributed by TRENSZ to a vibrio, is described at some length. Tuberculosis was diagnosed in 31 of 7,393 persons treated in hospital, i.e., 0.41 per cent. of admissions; its incidence in the interior is quite unknown. Venereal diseases, three-fourths syphilis, form 20.7 per cent. of the

general morbidity. In the extreme north syphilis is stated to furnish 64 per cent. of hospital admissions and attendances; **BENEDETTI** believes that 80 per cent. of the local population is infected. The author would combat it not by the creation of dispensaries but by multiplication of obstetrical consultations, a number of midwives each with a small area of action, and visiting nurses.

In the last two years 383,000 persons have been examined for trypanosomiasis and 4.5 per cent. found infected; its regional distribution is described. The disease is most prevalent on the eastern frontier where Gabun joins Moyen Congo.

Finally the author gives diagrams of the mortality from sporadic, endemic and surgical diseases over a series of ten years, as culled from hospital statistics.

ii. This paper deals with hospitals, vaccination, maternity and child welfare, depopulation and infant mortality, the causes of which are discussed, sanitary surveyance of labourers, prevention of trypanosomiasis, urban hygiene and plans for the further extension of medical services to the natives. One notes that there were at the end of 1930 15 doctors in the colony and a midwife; 86 native infirmiers and 4 infirmières. Statistics of the population for 1925 to 1929 show a diminution from 394,000 to 334,000, but the interpretation of these figures is difficult because the census taken in 1930 yielded 390,000. Other figures, however, are given to demonstrate the decline of population.

A. G. B.

HARGRAVE (W. W.). Health Conditions in American Samoa. Report of the Health Department for the Year ended June 30, 1930.—U.S. Nav. Med. Bull. 1932. Jan. & Apr. Vol. 30. Nos. 1 & 2. pp. 104-133; 263-284.

Commander Hargrave, Senior Medical Officer at the U.S. Naval Station, gives a full account of the health conditions of these islands. The total deaths for 1930 in the population of 9,985 were 177; a crude death rate of 17.7 per mille. The infant mortality—41 deaths—was 104.07. The births numbered 394, a rate of 39.4 per mille; 220 were males and 174 females. It is noted that the system of collecting vital statistics is such as to make it unlikely that any births or deaths are unreported. Pneumonia was the chief cause of mortality, 160 cases with 40 deaths; bronchopneumonia was the predominating type. Tuberculosis, which caused 35 deaths, has been the leading cause of death for several years, but has diminished slightly in the last three. Filariasis was the primary cause of 19 deaths and influenza of nine. Five deaths were attributed to ascariasis.

The health of the Samoans was excellent throughout the year. The only epidemic was one of dengue in May-July. It is stated that practically every home in American Samoa is visited at least twice a week by some representative of the public health department so that all illnesses come to light. There were recorded 1,413 cases of Samoan conjunctivitis during the year, less than half those in 1929; it was almost uniformly present throughout the year and not chiefly in the breadfruit season.

It is "an acute inflammation of the eyes, which is more prevalent during the breadfruit season when flies are numerous. The conjunctiva and the

cornea are both frequently involved and serious consequences to the eye result either from neglect or from the native Samoan treatment.

"The Health Department Survey completed April 1, 1930, shows that there are 270 persons of all ages in American Samoa who are blind in one eye, or 2.92 per cent. of the total population and that there are 99 persons totally blind, or 1.07 per cent. of the total population. The percentage of blindness is high and is largely attributable to Samoan conjunctivitis and the Samoan or native practices that ensue."

No case of measles was reported this year; this disease occurs periodically in epidemic form with serious consequences; the last was in 1926. Bacillary dysentery was epidemic in Fiji in 1929-30 and in Western Samoa (British) early in 1931, so that quarantine was established against those islands. However, in March a case was discovered in American Samoa and others occurred in that and the succeeding months. There were three deaths, a fatality rate of 11 per cent. Whereas the Shiga bacillus was isolated in Fiji, in American Samoa cultures were negative except in two instances, in which the Flexner-Strong type was recovered. Typhoid is endemic but only five cases were reported. Of filariasis 641 cases were reported. It is stated that 665 persons in American Samoa are disabled from 5 to 6 days 3 or 4 months a year by some manifestation of filariasis; 239 have elephantiasis, 426 have fever or acute swelling or filarial abscess. Symptoms are rare before the age of 20, but practically 60 per cent. of the adults have microfilaria in their blood. "Filariasis probably causes greater damage than any other disease by reason of the disabling effect and the undermining of general health which in a way predisposes to other infections." Mosquito control is difficult because the vector, *Ae. variegatus*, bites by day and flourishes in the bush as well as in and around houses.

There were 679 admissions for yaws in this year, a drop from 1,040, which again was a drop from 1,404 in 1928. To avoid duplication of returns, cases are now reported by name, age, sex, and residence. A health survey showed that 5,719 persons out of 9,765 had, or gave a history of, yaws. 214 Kahn tests gave 91 per cent. positive reactions. The natives believe that yaws should not be treated till secondary lesions have developed and this is supported by SCHÖBL's work [this *Bulletin*, Vol. 25, p. 662]. Late or tertiary yaws is rarely seen in American Samoa which the author attributes to the fact that there are now few untreated cases. The Samoan has a decided antipathy to injections so that the author tried spirocide (acetarsone, stovarsol) given by mouth to 25 children with most satisfactory results. The cost of this treatment is five times as great as by neoarsphenamine injections but there are advantages in the enthusiasm for it of the parents and the willingness of the children to come for it. No case of syphilis was seen and only 8 cases of gonorrhoea. Roundworms, whipworms and hookworms are common but there is no marked debilitating effect from hookworm infestation.

The total cost of the health services was 92,711 dollars or 9.28 dollars per head per year, of which the U.S. Navy paid 8.14 dollars. All medical and surgical treatment is free to the Samoans, whether in their homes or in hospital. It appears that the collection of vital statistics is conducted with great efficiency and the author writes: "An experienced statistician is as essential to the organization as a qualified laboratory or X-ray technician." There is other matter of interest in this long report.

A. G. B.

VENEZUELA GULF OIL COMPANY. **Hospital of Venezuela Gulf Oil Company. Fifth Annual Report. 1930.** [COOK (W. W.).]—77 pp. With 6 figs., 1 chart & 2 graphs. Maracaibo, Venezuela.

This Oil Company issues an Annual Report of its Hospital. The one under notice contains a number of papers on the diseases seen, laboratory statistics, and the usual tables. The Superintendent, Dr. W. W. COOK, notes that amoebiasis is a common infection at Maracaibo, and several cases of liver abscess are admitted each month; details of three cases are given; 7.5 per cent. of the total admissions are attributed to amoebiasis. Professor MÜHLENS of Hamburg writes on the diseases of Venezuela. At present, he says, there is not a sure focus of yellow fever in the country but its carrier [attractively named by the printer *Stegomyia fascinator*] is abundant. Plague also is not now reported. Figures are given of the malarial index; blackwater fever is said to be rare. Relapsing fever and Chagas' disease are frequent in certain parts. Dermal leishmaniasis, especially that with deep destruction of bone of mouth and nose, called espundia, is not rare. Rectal schistosomiasis is endemic in some parts and *F. bancrofti* infestation, but elephantiasis was not seen. Tumour-like diseases of the dorsa of the feet and toes were noted by MÜHLENS; they suggested mycetoma and mossy foot. The feet and legs were swollen as in elephantiasis. The spirochaetes described by STRONG in the similar disease in Amazonas were not found [see this *Bulletin*, Vol. 24, p. 324]. Ill-defined fevers, often treated as malaria, are probably typhoid and paratyphoid, especially para A. Drs. LEONARDI and WALKER describe two cases of relapsing fever, the spirochaetes seen in which were assumed to be *Sp. venezuelensis* and the vector *Ornithodoros venezuelensis*.

The laboratory statistics furnished by Dr. A. J. WALKER show 384 positives for tuberculosis (sputum) or 18.7 per cent. of examinations in a five-year period. In the last two years the Kahn reaction was tested twice yearly on all native employees—6,671 and 5,083 examinations. The positives in these years were 22.6 and 22.0; reactions in malaria and weak reactions in patients under treatment are omitted. The results of stool examinations are tabulated; the percentage of *E. histolytica* findings, 4 per cent., is not excessive. A. G. B.

WAR OFFICE. **Report on the Health of the Army for the Year 1930. Volume LXVI** [FAWCUS (H. B.), Director-General, Army Medical Services].—pp. iv + 151. With 4 charts. 1932. London: H.M.S.O. [2s. 6d.]

This report contains much that is of interest to *Bulletin* readers. In the Notes on Diseases the following extract illustrates the difficulties of antimalarial work:—

"Little anti-malarial work by the military authorities is possible in this area [Shanghai]. The troops live in hutted camps on a minimum of ground space surrounded by Chinese-owned land and sluggish streams, ditches and swamps, all swarming with mosquitoes. The municipal authorities, whose actions are restricted by fear of political complications, have made certain essays at anti-malarial work by oiling, the use of Paris green and by the introduction of predatory fish, but the oiling was objected to on account of the smell, the Paris green on account of its lethal action on the local ducks, while the predatory fish, though in no way objected to, only acted as an 'extra' to the dietary of both Chinese and ducks."

Apropos of the fact that sand-fly fever caused 3,199 admissions of soldiers to hospitals (and was 5th on the list), whereas dengue was diagnosed in only 822 cases :—

“ It is surprising that an infection so widespread in its range should be responsible for less sickness than sand-fly fever. There is reason to believe that some considerable proportion of the cases diagnosed as sand-fly fever in India are in reality dengue, an opinion supported by the high re-infection rate which is recorded for sand-fly fever in some Indian stations. In experimental work with dengue fever, some of the successful infections are so mild that the subjects show none of the classical signs, and little or no constitutional reaction, and yet are infective to mosquitoes. The grouping of such mild attacks occurring naturally, varies according to the views of the observer, and in some stations they will be called dengue, in others, sand-fly fever, influenza or P.U.O.”

Two cases are described of epilepsy due to cysticercosis and it is stated that several others have been met with in men who have served in the tropics.

Health of the Army Abroad—India—

The principal causes of admission to hospital of 33,882 soldiers (611 per 1,000 of the strength) were :—

Malaria	...	...	...	...	6,564
Sand-fly fever	...	...	...	...	2,739
Inflammation of areolar tissue	...	...	...	...	2,219
Inflammation of tonsils	...	...	...	...	1,667
Gonorrhoea	...	...	...	...	1,519
Dysentery	...	...	...	...	1,264
Diarrhoea	...	...	...	...	979
Dengue	...	...	...	...	523
Boils	...	...	...	...	410

28 dysentery carriers were admitted.

Under *Enteric Fevers* it is noted that there were 69 fewer admissions for typhoid than in 1929. At the end of 1929 and during 1930 the great majority of the troops were reinoculated with two doses of $\frac{1}{2}$ and 1 cc. T.A.B. vaccine instead of, as in former years, one dose of 1 cc. The sudden decrease may be related to this. The diagnosis in 90 per cent. of British and 86 per cent. of Indian cases was made by blood culture; the average day of successful culture was the 7th. Cultures must be incubated for several days before a negative report is made.

The table gives the incidence of enteric among protected and unprotected troops :—

Group.	Strength.	Actuals.		Ratio per 1,000		Case mortality per cent.
		Cases.	Deaths.	Cases.	Deaths.	
Protected ...	54,236	182	11	3.36	.23	6.0
Unprotected ...	1,191	25	2	20.99	1.68	8.0

Of the 1,264 cases of *dysentery* among British troops the following types were found :—

Protozoal (<i>E. histolytica</i>)	...	...	...	...	185
Bacteriologically proven bacillary dysentery	...	...	...	...	431
Bacillary exudate (no dysentery bacilli isolated)	...	...	...	...	389
Clinical	...	...	...	...	259

} 820

It is considered that the exudate described as bacillary is pathognomonic of bacillary dysentery. Thus 64·8 per cent. were bacillary, 14·6 per cent. protozoal and in 20·4 per cent. the cause was not discovered. Most of these are considered to be mild Flexner infections and a small proportion mild *histolytica* infections. Bact. Flexner is the main source of dysentery in India; it is usually very mild but may be very severe, while Bact. Shiga infections, usually severe, may be mild. A table is given of the results of examinations of Indian menials for *E. histolytica* cysts. The proportion is about 10 per cent. Since only three examinations are carried out prior to enrolment of cooks, etc., many carriers must be missed, but "it seems that such carriers do little harm." There has been a drop in the incidence of amoebic dysentery, amoebic hepatitis and liver abscess since 1924, due to improved diagnosis and treatment.

Malaria. The trials of plasmoquine and quinine in 1929 in treatment were noticed in this *Bulletin* (Vol. 28, p. 1007, MANIFOLD). It was highly satisfactory in controlling pyrexia and preventing relapses. The dose of plasmoquine was 0·04 gm.

"Work during 1930 carried out at the anti-malarial centre was largely directed to ascertaining whether by reducing the dose of plasmoquine to 0·03 grm. per diem equally good results could be obtained in the treatment of the disease and the prevention of relapses. The results up to date indicate that the percentage of relapses is approximately the same as with the larger dose and that symptoms of toxæmia are negligible. One hundred and thirty-three men at the malaria treatment centre were given a full course of this treatment as out-patients. These men all carried out their ordinary duties and recreations throughout the course.

"This treatment has also been carried out during the year under the supervision of the specialist in medicine, Southern Command. Two hundred and thirty-three cases were treated with only 5 relapses. The patients in this series were kept in hospital for 8 days from the onset of the attack of pyrexia, and were then discharged from hospital to attend daily for the remaining 13 days of the course. During the latter period they were excused all duties."

The urine of a number of chronic malaria cases was found to contain albumin—16 out of 58 in hospital. "It was considered that the quinine was the main agent in the production of the albuminuria." Under Anti-Malarial Measures we read:—

"An 'oil bomb' consisting of empty cigarette tins perforated with holes and filled with oily rags was devised at the M.T. depot at Chaklala. These tins were thrown into the ponds, etc., and were found to oil the water satisfactorily. A novel method of oiling ponds where opposition had been encountered was devised by one warrant officer in charge of anti-malarial work. His method was that of oiling the local buffaloes during the night, so that during the day they acted in a similar manner to the oil bombs described above, although on a larger scale."

Spraying experiments for barrack rooms are described; they seem to have been less successful than those recently described in this *Bulletin* (HOLT, ante, p. 318).

A. G. B.

KLEINE (F. K.). Der Anteil R. Kochs an der Erforschung tropischer Seuchen. [**R. Koch's Part in the Investigation of Tropical Diseases.**] —*Deut. Med. Woch.* 1932. Mar. 25. Vol. 58. No. 13. pp. 505–508.

In the celebration of the jubilee of the discovery of the tubercle bacillus, of which the German journals are naturally full, Kleine who

worked with KOCH for many years contributes an account of his discoveries in the tropics.

In KOCH's cholera expedition to Egypt (1883) he found parasites which were not bacteria in the gut mucosa of a man dead of acute *dysentery*, and again in the liver capillaries in a case of liver abscess. His pupil, KARTULIS, studied these bodies—amoebae—and showed their relation to dysentery.

While in Dar-es-Salaam in 1897 he heard that there was a disease with *plague*-like symptoms at Kisiba on the Victoria Nyanza. KOCH sent ZUPITZA to the spot, near the Uganda border. In the preparations made by him KOCH recognized the plague bacillus. Thus another endemic focus was revealed.

R. PFEIFFER, writing in 1892, stated that in reference to the possible development of the *malaria* parasite outside the body KOCH had suggested its conveyance to man by a blood-sucking insect. ROSS's work followed in 1897. In investigations in New Guinea and Java KOCH showed the great difference in the percentage of those infected at different ages. Children under 2 years had 100 per cent. of parasites, those between 2 and 5 years 46.1 per cent., those between 5 and 10 23.5 per cent., and adults none. He concluded that with continual subjection to infection an immunity develops. He tried to infect anthropoids but without success. He concluded that man and anopheles are the only hosts, and seeing the difficulty and expense of eradicating the mosquitoes he recommended careful treatment of those recognized by microscope to be infected, and the prevention of new infections by quinine prophylaxis. An experiment to the first end in Dar-es-Salaam was unsuccessful owing to changes in the population and the insufficient parasitocidal action of quinine. In 1900 on KOCH's instigation Europeans in East Africa and New Guinea began quinine prophylaxis, and from that date the deaths from malaria and blackwater diminished.

His work on *relapsing fever* in East Africa was synchronous with that of DUTTON and TODD. He watched the development of spirochaetes in ticks which had fed on infected monkeys, and questioned the existence of a stage in which these parasites were invisible. In 1897 he made an experiment of immunizing cattle against *tsetse disease*. He passed the trypanosomes through rats and dogs and then back to healthy cattle, and found that parasites so treated were weakened in virulence. From the susceptibility of so many species of animal, the variability of virulence and the varying morphology in different animal species KOCH (1904) concluded that the trypanosomes of the *brucei* group were not yet fully adapted to their hosts and were not fixed species; they were in a stage of mutability. At a time when BRUCE believed that the tsetse transmitted the trypanosomes mechanically like a soiled needle, KOCH thought that in view of the scantiness of parasites in the blood in many instances there must be a development in the insect and he was confirmed in this opinion by the twice repeated discovery by one of his colleagues of trypanosomes in the salivary glands of tsetse. His arguments influenced KLEINE who in 1909 proved that this view was correct. In 1906 KOCH was sent to East Africa in charge of a Sleeping Sickness Commission and here KLEINE attributes to him two advances—the study of thick blood films stained, without previous treatment, with eosin and azur II for discovery of trypanosomes, and the introduction of systematic treatment by atoxyl to

eradicate the disease ; he sought to get rid of the source of infection by keeping the blood of the infected free from parasites.

Nothing is said here of KOCH's contributions to the investigation of diseases of domestic animals in Africa—rinderpest, East Coast fever, African horse sickness—which Kleine describes. It will be admitted that KOCH's part in the investigation and combating of diseases in the tropics was extraordinarily great. Had he been able to spend longer periods away from Berlin, it might have been even greater. *A. G. B.*

RUGE (Reinhold). Welche von den sowohl im tropisch-subtropischen Gebiet als auch in der eigentlich (mittleren) gemässigten Zone vorkommenden Krankheiten sind als Tropenkrankheiten zu bezeichnen ? [**What are Tropical Diseases ?**].—*Arch. f. Schiffsu. Trop.-Hyg.* 1932. Jan. Vol. 36. No. 1. pp. 19-22.

A further paper on this subject [*ante*, p. 231] which has come into importance since "tropical diseases" now count under the German Sickness Insurance Law. The author briefly discusses the diseases whose position might be regarded as doubtful. He would include under tropical diseases, malaria, ankylostomiasis, cholera, dengue and pappataci fever, kala azar, leprosy, undulant fever, plague and tick-transmitted relapsing fever. He would exclude, as cosmopolitan, bacillary dysentery, typhus, smallpox and louse-transmitted relapsing fever. *A. G. B.*

MASCALL (A. J.). **Notes on Certain Tropical Diseases.**—*Trans. Faculty of Actuaries.* 1931. Vol. 13. Pt. 8. No. 122. pp. 289-312.

Mr. Mascall, Assistant Secretary, Standard Life Assurance Company, discusses in an interesting manner malaria, blackwater fever, yellow fever, filariasis, cholera, dysentery, sprue, sleeping sickness, leprosy, as diseases to which the higher mortality of assured lives in hot countries can be attributed, besides hookworm disease, yaws, beri beri and pellagra which have little influence on assured lives. A long discussion followed. *A. G. B.*

BALFOUR (Margaret I.). **Résumé of Report on the Role of Medical Women in Exotic Countries.**—*Jl. Assoc. Med. Women in India.* 1931. Nov. Vol. 19. No. 4. pp. 5-6, 8-10, 12, 14-25.

The term, exotic countries, means here countries outside Europe, but the report deals in fact with the less developed countries. The information was obtained by a questionnaire to which replies were received from 43 medical women in 18 different countries. The subject matter is considered under the heads :—

"I.—The special needs which require the presence of medical women in exotic countries and the extent to which these needs are being met.

"II.—Suggestions for forwarding the work of medical women in exotic countries in order to meet the needs more fully."

I. is subdivided into—habits and custom of the people, conditions of child birth, infant mortality, venereal disease, miscellaneous.

This report, itself a résumé, cannot be summarized but is worth reading. *A. G. B.*

- i. LULL (George F.) & LOPEZ RIZAL (L.). **Causes of Death among White Residents of Manila.**—*Milit. Surgeon*. 1931. Dec. Vol. 69. No. 6. pp. 619-624.
- ii. PEAK (I. F.). **Phlippinitis.**—*Ibid.* pp. 595-607. [10 refs.]

i. Here are studied the mortality statistics of white residents of the City of Manila for the ten years 1921 to 1930 : members of the army and navy are excluded. There were 418 deaths, 353 of males, 65 of females. A table shows their distribution by quinquennial age groups. Excepting a group of 13 under 5 years almost all were twenty years and upwards. The mortality rates of Americans in Manila are considerably lower than for the U. S. registration area but the age distribution is very different. The most important causes of death among 143 [? 147] residents of ten years and more were as follows :—

Cardiac disease	...	...	24	Syphilis (all types)	...	...	5
Nephritis and Cardio-renal	...	...	18	Cerebral Haemorrhage	...	...	5
Malignant disease	...	...	13	Appendicitis	...	...	4
Tuberculosis (all forms)	...	...	10	Pernicious Anaemia	...	...	3
Pneumonia	...	...	8	Malaria	...	...	3
Dysentery (all types)	...	...	8	Death by violence	...	...	3
Cirrhosis of liver	...	...	7	Diabetes	...	...	2
Alcoholism (including alcoholic psychosis)	...	...	6	Bronchial Asthma	...	...	2
				All others	...	...	26
Total	...	...	...	...	...	...	147

This is compared with the State of Michigan in which the most important causes of death were, in the order mentioned :—

Organic heart disease	Cerebral haemorrhage
Diseases of the respiratory system (exclusive of T.B.)	Accidents
Cancer	Tuberculosis
	Nephritis

Taking all the deaths in Manila in the ten-year period cirrhosis of the liver accounted for 3·8 per cent. and alcoholism for 3 per cent. In Filipinos liver cirrhosis is a rare cause of death, one or two a year among the 300,000 population of Manila City. Suicide also ranks high among Americans. Tropical diseases, dysentery and malaria excepted, do not appear in the list.

ii. A discursive discussion of the effects of tropical service on the mind. The author states that he was little more than a year in the country.

A. G. B.

- LULL (George F.). **Since the Days of the Empire.**—*Milit. Surgeon*. 1931. Nov. Vol. 69. No. 5. pp. 512-517.

This article, by the Medical Adviser to the Governor General, Philippine Islands, gives a table of annual death rates per 100,000 Philippine population for tuberculosis, malaria, beriberi, dysentery, cholera and smallpox from 1904 to 1929 and briefly discusses the epidemiology of each. The only one of these diseases which is clearly increasing is beriberi and measures to combat it are made difficult by the fact that Filipinos like a highly polished rice ; it tastes better and keeps better than one undermilled or unpolished. It appears that augmentation of the diet is likely to be more effective than an attempt

to substitute unpolished rice. Intestinal parasitic infestation and nutrition and diet are also briefly discussed in relation to the diseases in question. A. G. B.

RONNEFELDT (F.). Behandlung von Verdauungskrankheiten bei westafrikanischen Eingeborenen. [**Treatment of Digestive Disturbances in West African Natives.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Dec. Vol. 35. No. 12. pp. 696-700.

Besides the parasitic diseases of the digestive tract functional disturbances are common in natives, either as a result of the presence of the parasites, or independently. These disturbances require symptomatic treatment. Not much can be expected from changes in diet. The common hypochlorhydria is easily improved by administration of HCl, which is often beneficial also in constipation. Flatulence must be treated with the usual remedies. Drastic purges, which are used by the natives themselves, are very important. Such symptomatic treatment can be carried out at small expense. The author refers to the inordinate, to the European, use of red pepper; this, he thinks, has to do with HCl production in the stomach, and if the European is to acclimatize himself he should take to this practice. For flatulence he mentions asafoetida to which the native takes readily. A. G. B.

FRONVILLE. Les affections du foie chez les indigènes. [**Liver Affections in Natives.**]—*Ann. Soc. Belge de Méd. Trop* 1931. Dec. 31. Vol. 11. No. 4. pp. 443-453.

A lecture given before the Cercle Médical du Katanga. The author reports the surgical affections of the liver seen by him at the native hospital between 1918 and 1929.

Liver abscess: 8 cases Not common because most of the dysentery is bacillary.

Tuberculosis: 2 cases, found at autopsy.

Adenoma: 1 case, found at autopsy.

Hydatid cyst: 1 case, again an autopsy finding.

Primary cancer: 8 cases, out of 25,000 hospital admissions.

Some interesting information is given about hydatid at Elizabethville. A table shows that in 11 months of 1924 and 1925, 563 hydatid cysts were detected at the abattoir, 530 in cattle (from Rhodesia), 29 in sheep and 2 each in goat and pig. The lung was by far the commonest site, about 10 times as frequent as the liver. The infected beasts represent about 10 per cent. of the slaughterings. Nothing is known of canine infestation. The author explains the rarity of hydatid in man by the facts that the pastures are far from centres of population, and there are no shepherds' dogs and no native cattle, only goats which are little affected. He suggests precautions against infection of dogs. A. G. B.

HICKS (C. Stanton), MATTERS (R. Francis) & MITCHELL (Mark L.). **The Standard Metabolism of Australian Aborigines.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1931. Mar. 16. Vol. 8. Pt. 1. pp. 69-82.

This is an interim report of work undertaken for the Carnegie Institute of Boston, as part of a general metabolic survey of aboriginal races

throughout the world. The Benedict portable apparatus was used and proved to be an excellent field apparatus. The chief difficulty lay in occluding the nostrils which in the aboriginals are large, widely spaced and often strengthened by extraordinarily firm cartilages. The subjects, forty in number, were all pure-blooded aboriginals of the Kokata tribe. Oxygen consumption was found to deviate by at least 11 per cent. for females and 13 per cent. for males using European standards of measurement. Standing and sitting height measurements showed that 52 per cent. of the subjects gave a von Pirquet index of over 100. In view of these abnormal pelidisi measurements it is considered doubtful whether European standards for computing basal metabolism are applicable in these cases. *M. E. Delafield.*

KRISHNAN (B. T.) assisted by C. VAREED. Basal Metabolism of Young College Students, Men and Women, in Madras.—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 831-858. With 4 charts. [14 refs.]

Basal metabolism determinations were made on 76 men and women of Southern India of ages ranging from 18 to 25. All the subjects were medical students who had some knowledge of metabolism and of the methods used in its study. The apparatus used was the Benedict-Roth with Collin's Kymograph attachment and body surface was computed from the Aub-Du Bois height-weight formula. Three determinations were made for each subject, and only the minimal basal rates were taken into consideration and compared with the standards of Du Bois, Harris-Benedict, Dreyer and Krogh. Taking the subjects as a whole the basal rate is considerably lower than the rates determined in other countries. The factors which account for the lowering of basal metabolism in South India by 12 per cent. in men and 16 per cent. in women as compared with the Du Bois standard are discussed. It is considered that the lowering of metabolism is due not to a racial difference but to the ready muscular relaxation in the tropical climate of Madras and to the low protein diet in South India. The influence of the menstrual cycle was also studied. A rise in basal metabolism is noted in the pre-menstrual period and in the second week after menstruation.

M. E. Delafield.

SHILLONG. King Edward VII Memorial Pasteur Institute and Medical Research Institute. The Fourteenth Annual Report for the Year ending 31st December 1930 [MORISON (J.), Director].—18 pp. With 1 folding chart. 1931. Shillong. [10d. ; 9 annas.]

The most interesting matter in this report is that relating to the combined cholera-dysentery bacteriophage prepared in the Institute, of which 112,213 doses were issued during the year. Cholera in Assam shows its heaviest incidence on the population of villages situated "along the banks of certain rivers which are spillways or old river beds." Two of the areas which come under this description, in Nowgong and South Sylhet respectively, have been selected for a test having something of the character of a statistically arranged trial. In South Sylhet ordinary methods, by which are meant vaccination, cholera mixture treatment and hygienic measures, were employed: in Nowgong bacteriophage was distributed to headmen of villages for use in every

case of diarrhoea or suspected cholera. The latter area "has passed through successive epidemic seasons and at the time of writing has not had a single death from cholera for ten months. This has not happened during the previous ten years." The former area has had a cholera visitation each season as usual. It may not be possible to continue this trial on the lines of a control area side by side with a test area but proof of the degree of efficacy of bacteriophage may still be forthcoming by its continued use in a single district which has ordinarily a periodic cholera incidence. It is evident that work of considerable importance is also being done in the Institute with respect to the separation and maintenance of what should now be recognized as definite types of cholera and dysentery bacteriophages.

W. F. Harvey.

FEDERATED MALAY STATES. Annual Report of the Institute for Medical Research for the Year 1930 [KINGSBURY (A. Neave)].—*Federated Malay States Ann. Rep. Med. Dept. for Year 1930*. Appendix I. pp. 95-185.

This is a model report, both in outward features and in inward conciseness and precision; about half of it—what may be called the better half—describes or reviews research; the ancillary half is a record of routine.

Under the general heading of Research the following particular investigations have to be briefly noticed. (1) A conspectus of the careful and comprehensive studies of Tropical Typhus that have been proceeding for some time and have already received considerable notice in this *Bulletin*. It is highly probable that the disease is a natural infection among rats in Malaya; it is practically certain that the causal agent is a small pleomorphic Gram-negative micro-organism, both intra- and extracellular, sometimes showing as minute coccil and diplococcal (virulent) forms resembling *Rickettsia*, sometimes as fusiform and diphtheroid bacilli (less virulent) and bipolar-staining cocco-bacilli; and it is more than probable that the usual transmitter to man is a *Trombicula* mite. Dr. L. ANIGSTEIN'S prophylactic vaccine prepared from formalized cultures of the micro-organisms is considered specially worthy of mention.

(2) The Malaria studies include a field experiment on the prophylactic value of plasmoquine; experimental inquiries on the effect of plasmoquine on gametocytes of *P. falciparum*; experimental treatment of malaria with quinine-stovarsol; and an account of a malaria parasite of monkeys (*Macacus cynomolgus*) carried (experimentally) by the local Anophelines. (a) In the field experiment on plasmoquine-prophylaxis a malarious rubber-estate was chosen for experiment and two neighbouring similar but less malarious estates were observed systematically as "controls." On the experimental estate everyone received plasmoquine twice a week (adults in 0.04 gm. dosage and children and young infants in dosage suitable). Unfortunately, from economic causes the population of this estate steadily declined; but the following figures are significant. Without any diminution of Anopheles breeding, in 9 months, among the original population of the experimental estate who remained, the *P. falciparum* gametocyte-rate fell from 10.6 to 0.0 per cent., and the malaria parasite-rate from 27.2 to 17.4 per cent. (The malaria parasite-rate on one "control" estate was 22.9 per cent. at the beginning and 23.8 per cent. at the end of the nine months; and in the other "control" estate it

fell from 17.2 to 13.7 per cent. in that term. (b) Experiments are described showing that fresh *Anopheles* fed on crescent-carriers before and after these had received plasmoquine did not become infective when the crescent-carriers had received 0.4 gm. of the drug and then remained non-infective for at least 3 days; that plasmoquine failed to stop nearly-mature crescents getting into the peripheral blood, but that it destroyed them in their early stages of development. (c) Experiments are described in critical detail showing the effects of quinine-stovarsol in treatment and on malaria-parasites and crescents, and also on the effect of quinine on the production of crescents; quinine was found to be little destructive on crescents and quinine-stovarsol to be no more potent than quinine. (d) An admirable study of a malaria parasite discovered in *Macacus cynomolgus* is described. In structure the parasite closely resembles *P. vivax*; infected red cells show enlargement, pallor, and stippling; it produces 8 to 14 schizonts; in some respects it also resembles *P. kochi* of *Cercopithecus* and *P. inui* of a Borneo monkey. It is easily inoculated into fellow monkeys. Three species of laboratory-bred *Anopheles* (*maculatus*, *kochi*, and *vagus*) took infection from monkeys, but *Culex fatigans*, *Stegomyia albopicta* and *Armigeres obturbans* "have been consistently negative" to infection. The oocysts (*A. vagus*) and sporozoites (*A. maculatus* and *kochi*) are impossible to discriminate from those of human malaria.

(3) Mosquito investigations confirm, by experiment with iron pyrites, the current statement that waters charged with iron are comparatively free from larvae of *Anopheles*; other experiments on colour-tropism of *Anopheles* are recorded. (4) Two cases of Japanese River Fever in young European planters are abstracted; in both there was a suspicious superficial lesion, and an eruption. (5) In Beriberi, for the liquid extract of rice-polishings the solid extract obtained by adsorption on acid clay has been substituted in tablet form; it appears to be beneficial, particularly in early stages of the disease, and may be of still greater value as prophylactic. (6) The results of an investigation of the diagnostic value of the Widal reaction with H and O agglutinins are recorded at some length. (7) Other experimental studies briefly noticed are a complement-fixation test cases of leprosy with an emulsion of *B. tuberculosis* as antigen; treatment of yaws by halarsol; treatment of "burning feet"; Schick-testing for diphtheria, the incidence of which malady seems on the increase, and Dick-testing for scarlet fever; potency tests for vaccine lymph; and bacteriological analysis of various water-supplies in the Federation. The typing of local pneumococci has been continued, and an account is given of the progress of canine anti-rabies vaccination. Formerly dogs bitten by or coming in touch with a rabid animal were destroyed, and all other dogs within a radius of about half-a-mile were given a single inoculation of 6 cc. of vaccine; this was good enough in outbreaks but did not much diminish the incidence of the disease. At present vaccination is a condition for a dog-licence, and the licensed dog has to bear a metal disc; in the year 3,200 dogs were inoculated in Kuala Lumpur.

From the recorded Routine of the Institute in its numerous subdivisions certain facts and events of more than local interest may be selected. (1) In prophylaxis against rabies in the human victim Semple's method is followed. Unused vaccine is discarded after the lapse of six months. During the year the number of cases (all races) treated was 160, with no death, but four fatal cases were reported, not one of which had received antirabic treatment; the brain was

examined in 106 animals, and Negri bodies were found in 38 dogs and 1 calf. To the Veterinary Department 3,365 doses of canine vaccine were issued. (2) In the division of pathology 117 cases of malignant tumours (carcinoma and sarcoma in their several types and varieties) were identified; 10 in Europeans, 3 in Eurasians, 8 in Malays, 68 in Chinamen, 1 in Japanese, and 27 in Indians (Tamils). (3) A widespread outbreak of smallpox necessitated enormous activity in the vaccine lymph department, an amount of lymph equal to the normal produce of two years being issued in three months of autumn. No reports of excessive reaction to vaccination, or of sequelae affecting the central nervous system have been received in this department.

A. A.

- i. ARCHIVES DES INSTITUTS PASTEUR D'INDOCHINE 1930. Apr. No. 11. pp. 45-65.—Services pratiques des Instituts Pasteur d'Indochine. [**Work of the Pasteur Institutes of Indochina.**]
- ii. ARCHIVES DES INSTITUTS PASTEUR D'INDOCHINE. 1931. Apr. No. 13. pp. 81-100—Fonctionnement des Services Pratiques des Instituts Pasteur en 1930.

i. There are three Pasteur Institutes in Indochina: Saigon, Nhatrang and Hanoi.

Saigon. A table shows for what purpose the 30,000 examinations were made and the results; examinations for malaria are listed separately. Nearly 14,000 were syphilitic tests, and nearly 10,000 were tests for dysentery. 1,804 persons presented themselves for antirabic treatment and 1,364 lasted the course; 7 of these died. The number of applicants rises yearly. The laboratory distributed 5,294,130 doses of antivariola vaccine, for which 279 buffaloes were employed and 6,808,318 doses of anticholera vaccine, besides 342,949 doses of divers other vaccines. In the year 1927, to permit of wholesale vaccination against cholera in Cochin-China, over 24 million doses were furnished. Of serums for treatment of various diseases 94,705 flasks were delivered. In the tuberculosis laboratory in the 4 years, 1926-1929, 260,000 doses of BCG were produced, sufficient to vaccinate 86,000 babies. A malaria laboratory is active; 5,981 blood examinations were made. The laboratory for the suppression of adulteration has examined wines, mineral waters, lemonade, syrups, conserves, milk; 2,787 estimations were required; 43 per cent. of the samples were not up to standard.

Hanoi. A similar table of microbiological examinations, including malaria, is given. 853 people came for antirabic treatment. Of antivariola vaccine 5,385,240 doses were supplied. Other vaccines mentioned came from Saigon. 24,533 Tonkinese babies have been immunized since 1926 by BCG. 615 liters of cultures of the Bulgarian lactic bacillus were supplied to practitioners.

Nhatrang. This institute is veterinary.

Under the heading Stations of Vegetal Biology details are given of the cinchona plantations. For the study of malaria the chief of the malaria laboratory together with an engineer spent a month in British Malaya and in Sumatra. They came to the conclusion that epidemiologically Cochin-China is more closely related to Sumatra for the lowlands and gray soils and to British Malaya for the red soils which for the most part constitute upper Cochin-China. The problem is, however, complicated by the presence of an anopheline carrier which is

practically absent in Malaya and Sumatra but is active in the Philippines. They pay a warm tribute to the work accomplished in British Malaya (monument grandiose à la gloire de la science coloniale britannique).

ii. The report for the following year is on similar lines and shows a general development of these services. A. G. B.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. 1932.
Jan. 1. Vol. 72. No. 1. pp. 3-18.—Jaarverslag van de Land-
skoepkinrichting en het Instituut Pasteur te Bandoeng over 1930.
[Annual Report of the Vaccine Establishment and the Pasteur
Institute at Bandoeng in 1930.]

From this report the following items may be cited :—

The total quantity of smallpox vaccine delivered by the institute sufficed for over 8·5 million vaccinations. As far as accessible for control the vaccinations were successful in 97·7 per cent. Experiments with desiccated vaccine, said to give very favourable results, are continuing.

Antirabic treatment was judged necessary for 874 patients out of 1,059 reporting for this purpose. 686 (117 Europeans and 569 natives) underwent a full course of treatment, either because they were bitten by actually rabid animals or because such could not be safely excluded. Out of the latter group in 6 cases (natives) rabies broke out notwithstanding the cure, in 4 cases within the limit of 30 days from the bite, in 2 cases 33 and 32 days after the infection. The cure itself gave no untoward by-effects.

The laboratory researches concerning the bacteriological types of pneumococcus on Java and on the diphtheria carrier rate among the native population have already been referred to.

The quantities of prophylactic and therapeutic sera and vaccines issued by the institute are mentioned.

Serious reactions following the administration of a mixed cholera-typhoid-dysentery vaccine induced a special study of this subject, which showed (1) that the rate of absorption of the vaccine which is retarded by the higher concentration of the mixed vaccine enables the dysentery bacillus to develop its local toxic action, (2) that women and children were much more susceptible to serious reactions than men, (3) that increasing the formol content of the vaccine from 0·5 to 0·8 per cent. did not render it atoxic, but greatly diminished its toxic effect. W. J. Bais.

KOUWENAAR (W.). Het Pathologisch Laboratorium te Medan. 1906-3 October-1931. [Pathological Laboratory Medan, 1906-31.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Nov. 1. Vol. 71. No. 15. pp. 1218-1227. With 3 plates.

The silver jubilee of the laboratory induces its present director to give a brief review of its history. The centralization of the hospital service on the East Coast of Sumatra in the beginning of this century, and the growing interest in questions of tropical pathology and hygiene urged many of the medical men to ask the advice of one of the few doctors who could at that time dispose of a well equipped clinical laboratory. A central laboratory to deal with these questions was therefore founded in 1906 by the three most important tobacco companies. Since 1918 the Government has given financial support, and in 1920 the institution was taken over by a

managing committee under the care of the two planters' associations. A short summary is given of the practical and scientific work performed by the laboratory workers in the course of these 25 years. The very important place which the laboratory holds in the well-known medical organization on the East Coast of Sumatra is clearly apparent. *W. J. Bais.*

- i. HUGHES (M.). **Tropical Ulcer.**—*Malayan Med. Jl.* 1931. Dec. Vol. 6. No. 4. pp. 116–123. With 3 charts, & 3 figs. on 1 plate. [11 refs.]
- ii. KERBY (T. R. F.). **Ulcus Tropicum, with a Reference to its Treatment by X Rays.**—*Lancet.* 1932. Jan. 30. pp. 235–237.

i. The author treated 77 cases of tropical ulcer in the Johore General Hospital; it is one of the commonest causes of disability among labourers in Malaya as elsewhere in the tropics. The average stay in hospital was 141 days, less for the younger and more, up to 232 days, for the older. He related it to ankylostomiasis but remarks later: "our figures for helminth infestation are low compared with Russell's for Malaya generally." All were males and the great majority Chinese. He states that BYRON found the calcium content of the blood of 84 Chinese suffering from ulcers to lie between 8.4 and 9.5 mgm. per 100 cc. [in the reference given the number of examinations was much smaller]; in 8 of his own cases the blood calcium was below 9.1 mgm. He divides the course of the disease into three stages: (1) the ulcer is filled with sloughs and spreading in all directions; (2) equilibrium; a mild sloughing destroys the granulations which have formed; (3) ulcer stationary or healing. In (1) treatment is directed towards the patient's general condition; removal of sloughs is inadvisable. In (2) debilitating factors should be sought and dealt with by appropriate treatment. Strong antiseptics may be applied to the sloughs and good results were obtained in two cases by quinine sulphate powder as recommended by INNES (*ante*, p. 237). In (3) treatment consists in the application of adhesive elastic strapping, as described by DICKSON-WRIGHT. It has been used with success in 159 cases of ulcer from various causes. Sub-granulation skin grafting is done thus:—

"Long narrow Thiersch grafts are taken from an anaesthesia area in the thigh and threaded through the eye of a needle. The graft is then sown deeply in the fibrous base of the ulcer, the two ends being left sticking out. As many grafts as necessary are sown. An elastic adhesive bandage is applied immediately and changed at weekly intervals thereafter. After about 14 days small islands of epithelium will appear corresponding to the ends of the grafts. Healing may be complete in another ten days if enough grafts have been sown."

He stresses that the elastic adhesive bandage must never be applied except in the healing stage.

ii. Dr. Kerby notes that the incidence of tropical ulcer among the native employees of the Rhodesia railways has decreased enormously wherever the wearing of putties has been required. He has tried various forms of treatment but the best results were obtained by "a thorough curettage with the application of 'bipp'." As the result of treatment of 6 cases, then interrupted, by staphylococcus antiviral he thinks this method is worth further trial. Later good results are obtained by firm application of zinc oxide strapping. X-ray therapy was disappointing; he was unable to satisfy himself that any appreciable improvement followed. Zinc ionization was only useful in

cleaning up residual indolent patches. In all cases the patient is put on a liberal mixed diet with calcium lactate and cod liver oil, and examination is made for any pathological condition which requires treatment.

A. G. B.

YOUNG (J. A.). *Ulcus Tropicum*.—*West African Med. J.* 1932. Jan. Vol. 5. No. 3. pp. 49–51.

Dr. Young discusses *ulcus tropicum* mainly with a view to its aetiology. He thinks the evidence for dietary deficiency, put forward by ORR and GILKS and by McCULLOCH, by no means convincing. McCULLOCH suggests that any mildly pathogenic organism may be the infecting agent, a second factor being absence of resistance. Objections to these suggestions are stated. The author notes that the infant and the aged escape, which is against a biting fly; that the agricultural tribes suffer heavily whereas the pastoral and hunting tribes escape lightly; that where there is marked seasonal rainfall the disease is most prevalent at the beginning of the rains; that it is improbable that infection is a mere chance transference, for in a large clinical experience he does not remember a single case of hospital infection. He notes the numerous failures to reproduce the disease, and points out that in the successes spirochaetes and fusiforms have always been present in the inoculum. These experiments cannot give clear results till pure cultures are possible. Finally, he advances a theory "which correlates most of the salient facts."

"The reservoir of infection may lie in the termite's nest—a natural moist incubator with an equable temperature. The surface activities of the termite are most marked at the onset of the rains. The immunity of the infant is explained, as is also the high incidence among field workers. Road gangs, whose work must drive ahead regardless of interruptions, would suffer heavily. One need not regard the termite as a specific carrier, it might be only a case of mechanical transmission on infected soil but the pre-ulcer bleb low down on the leg is readily explained as the termite is seldom permitted to climb any distance. Lastly, but not least, the termite has been shown to harbour a fusiform bacillus." A. G. B.

RICOU. Traitement des ulcères phagédéniques et autres plaies infectées par la poudre et la pommade Ballot. [*Treatment of Phagaedenic Ulcers by Ballot's Powder and Ointment*.]—*Bull. Soc. Méd. Chirurg. Indochine*. 1931. Nov.-Dec. Vol. 9. No. 10. pp. 803–806.

The treatment is said to be excellent but the formulas of the powder and ointment are not disclosed.

A. G. B.

DELAMARE (G.), GATTI (C.) & BRUYN (D.). L'ulcère pseudo-membraneux du Paraguay. [*Pseudo-Membranous Ulcer of Paraguay*.]—*Bull. Acad. Méd.* 1932. Jan 26. 96th Year. 3rd Ser. Vol. 107. No. 4. pp. 115–119. With 3 text figs.

Single ulcers of this type were seen in three patients between the years 1927 and 1931 among 200 chronic ulcers of the lower limbs. Bacteriologically they suggest the ordinary tropical ulcer, but the phagedaenic process was slight or wanting. In one instance the ulcer was auto-inoculable. The fusiforms and spirochaetes disappeared with applications of chromic acid and two of the ulcers healed under arseno-mercurial treatment.

A. G. B.

ASHFORD (Bailey K.) **Anaemia in Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Dec. Vol. 7. No. 2. pp. 119–144. [4 refs.]

In former days anaemia in Porto Rico was practically always taken to imply ankylostomiasis, but at present this infestation as a cause of serious illness or incapacity to work is probably not a tenth of what it used to be. The author analyses 300 cases selected from over 1,100 and concludes that many are due fundamentally to nutritional errors, protein starvation, excess of carbohydrates and fats, intestinal toxæmia, in conjunction with a monotonously warm climate and deficient exercise, resulting in bone-marrow changes, deficiency of hormone with, in many cases, definite hypoplasia.

H. H. S.

ECKHARDT (August). Behandlung sekundärer Anämie mit Ferronovin in der Tropenpraxis. [**Treatment of Secondary Anaemia in the Tropics with Ferronovin.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Feb. Vol. 36. No. 2. pp. 77–80.

Ferronovin is a preparation of the Chem. Fabrik Promonta, Hamburg, and is stated to contain liver substance, vitamin D and siderac (active oxide of iron). The author here shortly reports on 28 cases treated with this product with good results.

A. G. B.

HEINEMANN (H.). Ueber die praktische Brauchbarkeit der Pallida-Reaktion im Arbeitskreis des Tropenarztes. [**The Practical Usefulness of the Pallida Reaction in the Routine Work of Physicians in the Tropics.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Jan. Vol. 36. No. 1. pp. 9–19. [Summary appears also in *Bulletin of Hygiene.*]

The author has tested in the complement fixation test antigen consisting of a suspension of cultural *Sp. pallida* in carbolized saline, as recommended by GAEHTGENS (*Bulletin of Hygiene*. Vol. 5. pp. 318 & 724). The antigen was obtained from the Sächsisches Serumwerk, Dresden. It was used in a dilution of 1 to 2, the amount added being 0.25 cc., with the same amount of patient's serum diluted 1 to 5, and 0.25 cc. of the required complement dilution. The method was tested on 526 sera from 436 patients, in parallel with the routine Wassermann, Müller's test and Meinicke III. In cases of syphilis and yaws it gave 93 per cent. positive reactions against routine W.R.62; Meinicke III, 55; and Müller, 75. In 16 sera from Europeans and better class Chinese with various diseases but no history or sign of syphilis or yaws all the methods gave negative reactions. In 265 sera from Javanese and Chinese hospital patients with no clinical sign of syphilis or yaws were 66 which gave positive reactions to one or more of the tests. Examination of the histories of these cases showed that all but 19 had most probably been infected with either syphilis or yaws. The tables relating to these 19 cases show that they gave positive reactions as follows:—One with all four tests; two with routine and Pallida Wassermanns and with Müller; one with routine Wassermann and with Müller; one with Müller only; three with Müller and with Pallida Wassermann; ten with Pallida Wassermann only; and one with routine Wassermann only. The author concludes that the

Pallida antigen affords Wassermann tests with a high degree of sensitivity, which usefully complements tests by the routine Wassermann and by Müller's method. [In spite of the author's explanations, the impression left by a study of the figures is that, while the Pallida method gave a much higher percentage of positive reactions in syphilis, it gave too many positives in non-syphilitic cases to be regarded as safe enough for diagnostic purposes. It appears, in fact, to be a good method for exclusion of syphilis and for early detection of relapse in treated cases.]
L. W. Harrison.

CH'IN (T. L.). **Syphilis of the Toes resembling Fungus Infection (Hongkong Foot). Report of Three Cases.**—*Chinese Med. Jl.* 1932. Jan. Vol. 46. No. 1. pp. 60–63. With 2 figs. on 1 plate.

“ Three cases of early secondary syphilis are reported in which the toes were involved in an ulcerative process closely resembling that frequently observed in superficial fungus infections of the skin. The presence of vesicular lesions in one case, and of a history suggestive of recurrent tinea infection in another raised the presumption of an antecedent fungus infection being a predisposing cause for the unusual localization of the syphilitic lesions.”

No mycological study was carried out, and in two of the cases arsphenamine injections led to the disappearance of the ulcers. The third patient ceased attendance.
A. G. B.

SCHILLING (Victor). **Neuere Leistungen der Methode des “ Dicken Tropfens.” [New Uses for the “ Thick Drop ” Method.]**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 230–239. [25 refs.]

The author refers to the great use that may be made of the thick drop and warns against simple draining off of the staining fluid. It should be gently washed off with distilled water to prevent adhesion of deposit to the film. It is advisable, moreover, to change the staining solution at least once by this method before the final removal of stain altogether. The newer uses of the thick drop method are considered from the point of view of the demonstration of polychromasia, “ inclusion ” bodies, and “ erythrokonts ” in true blood diseases. *W. F. Harvey.*

PONS (Juan A.). **The Red Cell Count and Hemoglobin in Porto Rico. From an Analysis of Hospital Cases.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Dec. Vol. 7. No. 2. pp. 203–208.

TORGERSON found the average red cell count of 100 hospital patients in Porto Rico to be $3\frac{1}{2}$ millions [this *Bulletin*, Vol. 28. p. 73] and SUAREZ gave 3·3 millions as the normal red cell count and 75 per cent. as the normal haemoglobin for the island. Pons's counts were made by five observers, to avoid personal errors ; the Dare haemoglobinometer was used. The average red cell count of 180 hospital admissions was 3·81 millions and haemoglobin 67·66 per cent. and when cases of manifest anaemia were eliminated the average count for 164 cases was 4·05 million and haemoglobin 71·56. For 96 private cases the counts

and haemoglobin were both a little higher. Details are given in tables. It is noted that these values are considerably higher than those given by others.

A. G. B.

CORBETT (G. H.) & HODGKIN (E. P.). **Laboratory Experiments on the Larvicidal Properties of Mineral Oils.**—*Bull. Inst. Med. Res. Federated Malay States*. 1931. No. 5. 20 pp. With 17 figs. [3 refs.]

The authors undertook a series of laboratory experiments in order that they might specify the properties which give larvicidal powers to mineral oils. Their paper contains a mass of careful work carried out under standard conditions: in most of the experiments they used fourth-stage larvae of *Anopheles vagus*. They present their results in such a way that one can see the very considerable inconsistencies that they got when experiments were repeated. For instance, using a particular sample of "heavy oil" they carried out five identical experiments at the same time, 100 larvae being used in each. After two hours the number of larvae killed ranged between 71 and 92 per cent. Apart from these inconsistencies, there are great difficulties of a physical nature, because two oils may be identical in most of their properties and yet widely different in some other property—a fact which is well known to workers on lubrication. Then again there are the biological difficulties, which arise from the fact that none of the physical properties of the oil gives a direct measure of its larvicidal efficiency. Moreover, we have no precise knowledge of the substances present in mineral oils which make them toxic to insects, though we know that the mere presence of oil in the tracheal system is not in itself harmful.

As a result of their work, the authors find that there are several factors which are of primary importance in a larvicidal oil. Among them are viscosity and surface tension; these control the spread of the oil on water and also its power of entering the spiracles of the insect. They mention also the aromatic content of the oil, its toxicity to larvae, and the degree to which a film which has been exposed to the air for several days retains its poisonous properties.

The reader of this careful report must feel some surprise that we are still so ignorant, for oiling is one of the oldest ways of controlling mosquitoes and is still of great value. The problems are of extreme complexity; the reviewer believes that they will eventually have to be studied for several years by at least two men: one should be an expert in surface chemistry and if possible should have considerable knowledge of oil technology, and the other should be an experimental biologist.

P. A. Buxton

TANNER (W. F.). **Inspection of Ships for Determination of Mosquito Infestation. With Appendix.**—*Public Health Rep.* 1931. Sept. 25. Vol. 46. No. 39. pp. 2306-2320. [Summary appears also in *Bulletin of Hygiene*.]

Records show that, in the days of sail, ships from yellow fever infected ports did sometimes harbour infected *Aedes aegypti*. Very little work has been done to ascertain to what extent mosquitoes, particularly the vectors of yellow fever, will survive on board steam

ships. A scheme was carefully worked out to determine this on vessels trading from ports in Central and South America and the West Indies to New Orleans and New York. The co-operation of the United Fruit Company was enlisted, but the investigation was hampered by the facts that inspection at the port of arrival had to be carried out without delay to ships, there was a dearth of trained inspectors, records kept by the ship surgeons were not sufficiently detailed and insecticides were commonly used during the voyage. But the evidence collected does tend to show that modern steamships do not provide breeding places for mosquitoes nor do they persist on board for more than two or three days after the ship leaves an infested port. If conclusive evidence is to be obtained it will be necessary to station trained personnel at the ports of departure to report full details of local conditions in regard to the ships and for trained inspectors to travel on board such vessels as are known to have been exposed to mosquito infestation.

Chas. F. White.

YEAGER (Clark H.). **Bored-Hole Latrine Equipment and Construction.**—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 681–749. With 46 text figs. & 7 plates. [10 refs.] [Summary appears also in *Bulletin of Hygiene*.]

Bored-hole latrines are permissible only in positions where there is no danger of infecting sources of domestic water supply. They can be installed in places where water is not encountered, but the disintegration of the dejecta appears to be not as rapid or complete as in latrines with a metre or two of water in them. The dry latrines do not last as long as those containing water, but with proper use a latrine not containing water should not be filled by an average family in less than four years. The author gives fully illustrated descriptions of the different types of boring plant required to meet varying conditions of soil and rock, methods for the lining of the bore-hole where necessary and the installations of latrine and water closets for bore-holes which have been found practicable and hygienic.

H. Home.

CHOPRA (R. N.) & MUKHERJI (B.). **Indian Species of *Artemisia*.**—*Indian Med. Gaz.* 1931. Nov. Vol. 66. No. 11. pp. 622–625.

Artemisia brevifolia Wall, which contains santonin, grows abundantly in parts of Kashmir but the cost of the raw material and of transport is too great for successful manufacture. Recently another species, *A. maritima*, has been found in the Kurram Valley in the North West Frontier Province growing freely; unfortunately the santonin content is poor, about half of that of Kashmir. Whereas Russian *artemisia* yields 1.2 to 1.4 per cent. the yield for Kashmir is 0.5 per cent. The month of collection is important: in June the plant contained no santonin, in July and August 0.1 to 1.0 per cent., in September 0.1, and later none at all. The therapeutic efficacy has been tested by Chopra and CHANDLER [see this *Bulletin*, Vol. 22, p. 672] but MAPLESTONE and Mukherji failed to obtain such good results and advise a combination of chenopodium and santonin for ascariasis. The demand in India for santonin is large.

A. G. B.

CHOPRA (R. N.) & MUKHERJI (B.). **Indian Chenopodium.**—*Indian Med. Gaz.* 1932. Jan. Vol. 67. No. 1. pp. 5-7.

This is an enquiry of the Indigenous Drugs Committee of the Indian Research Fund Association. Chenopodium was used by the American Indians in the time of Columbus; it was introduced to Europe in 1881 for hookworm disease with discouraging results, but SCHÜFFNER and VERVOORT (1913) in Sumatra recorded excellent results with it [this *Bulletin*, Vol. 1, p. 700]. It is obtained from American wormseed from which the oil is distilled in Baltimore and Illinois. The active principle, ascaridole, varies in the samples from 40 to 70 per cent. Chenopodium grows also in the East Indies and India. Its cultivation was tried in two places in India but with no commercial success.

Examination by HENRY and PAGET showed that whereas the American oil contained 65 per cent. ascaridole the Indian content was only 46 per cent. Other differences appear in a table. However the clinical effects of the Indian product appear to have been good. The yield of poor oil may be due to poor cultivation or to faulty distillation methods. Though the introduction of carbon tetrachloride has reduced the demand for chenopodium, since mixed parasitic infection is the rule in India a demand is likely to remain. However the price of chenopodium oil is 32 rupees per lb. against 2½ for CCl₄. In Java cultivation has produced an oil which approaches the standard American oil closely.

A. G. B.

TOURNIER. Le kermès. Ses applications en pathologie exotique. [**Kermes and its Employment in Tropical Medicine.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.-Nov.-Déc. Vol. 29. No. 4. pp. 871-875.

Kermes is a compound of sulphide of antimony and pyro-antimoniate of sodium in the proportion of 7 : 2; it is insoluble in water but soluble in acids. It exists in two forms, the most active of which is a coarse violet-red powder. It is given by the mouth either in cachets or in a draught in doses up to 40 cgm. 3-4 times daily; larger doses may provoke vomiting. It causes no unpleasant symptoms either during its administration, which may be prolonged for 3 months, or afterwards. Herein it has a great advantage over tartar emetic. It must be kept in coloured bottles and only made up when required. The author has used it for guinea worm, in vesical schistosomiasis (one case mentioned), in visceral leishmaniasis (2 cases) and in leprosy. It is advised for children, old people, and patients with heart lesions, rather than tartar emetic.

A. G. B.

FAKHRY (A.). **A Case of Severe Asphyxia after a Tartar Emetic Injection resuscitated by Cardiac Puncture.**—*Jl. Egyptian Med. Assoc.* 1932. Mar. Vol. 15. No. 3. pp. 106-107.

A female of 52 kilos with round worms and *Schistosoma haematobium* received 1 grain of tartar emetic (6 per cent. sol.) intravenously. She shortly became unconscious, with face cyanosed, respirations slow and shallow, insensitive corneae and heart sounds inaudible. Artificial respiration and injection of various drugs did not avail to restore her till adrenaline was injected into the heart cavity. She revived after 1½ hours. The author in about 120,000 injections of tartar emetic has not encountered such symptoms.

A. G. B.

WILLIMOTT (Stanley G.). **A Fatal Case of Quinine Poisoning.**—*Lancet*. 1931. Nov. 21. p. 1133.

A child of 5 years swallowed 26 5-grain tablets of sugar-coated quinine sulphate, and died in asphyxia $3\frac{1}{2}$ hours later. Chemical examination discovered quinine in the stomach and a trace in the liver, none in other organs. A. G. B.

ZANETTI. Index de robustesse pour le recrutement des travailleurs au Congo Belge (index de Pignet et Lefrou). [**Index of Robustness for the Recruiting of Labour in Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Dec. 31. Vol. 11. No. 4. pp. 423-441.

The author points out that for big industries or enterprises of construction recruiting at a more or less great distance is essential and that the first selection is non-medical. He discusses here the relative merits of the index of Pignet, that of Lefrou [this *Bulletin*, Vol. 28, p. 865], and simple inspection. Of 7,890 labourers recruited in Belgian Congo 1,966 had a Pignet of 0-20, and 91.9 per cent. completed their contract; 3,238 had a Pignet of 21-30 and of these 88.6 per cent. completed; 813 had a Pignet of 36 and over and only 47 per cent. completed. LEFROU'S index differs from PIGNET'S in that the sitting height replaces the standing height. These indices are compared for batches of different tribes classed according to height, and it is noted which natives would be refused or accepted by the methods in question. A general conclusion is that Pignet's index gives more recruits than Lefrou's for the Bantu as compared with the Sudanese races. The author evidently prefers Pignet. A. G. B.

CHAPPAZ & THIERRY. Sur les mesures administratives prises en Tunisie contre les rongeurs. [**Administrative Measures against Rodents in Tunis.**]—*Tunisie Méd.* 1931. Dec. Vol. 25. No. 10. pp. 571-574.

The measures consisted in the use of poisoned baits, nux vomica 1 kgm. to 10 kgm. of corn (wheat, barley or oats), or "campagnolicide AL" the base of which is strychnine, 11 gm. to 5 kgm. of corn. Nux vomica acts so quickly that the gerbille is seized with convulsions before it can retreat to its hole. The corpses are collected next day. In an area of 200 sq. metres 377 were found. The cost is 5 to 10 francs a hectare. The proprietary substance was equally effective but more costly. The results are stated to have been good in the saving of the olive trees, but the seasonal reappearance of plague was not prevented. A. G. B.

i. HASSELMANN (C. M.). Studies on Glandular Fever (Druesenfieber Pfeiffer) with Lymphoid Reaction. Report of the First Cases from the Tropics.—*China Med. Jl.* 1931. May. Vol. 45. No. 5. pp. 385-432. With 3 charts in text & 3 figs. on 2 plates. [3 pages of refs.]

ii. —. Ueber lymphoide, letale Reaktionen im Säuglings- und Kleinkindesalter in den Tropen. [**Lethal Lymphoid Reactions in Nurslings and Young Children in the Tropics.**]—*Arch. f. Schiffsu. Trop.-Hyg.* 1931. Dec. Vol. 35. No. 12. pp. 687-695. [Refs. in footnotes.]

i. This long paper describes three case of glandular fever with lymphoid reaction which came under the care of the author in the Philippine

Islands, and in addition the etiology, symptomatology and differential diagnosis of the disease are fully treated. Careful blood counts were carried out in each case and the types of cells which predominated in the blood picture are carefully described. The method of making blood films was Naegeli's cover slip method and Grüber's original Giemsa stain is recommended as the only stain which could be relied on to differentiate the various types of cells.

ii. Covers much the same ground. Fatal cases in children of 4 years and 4½ months are described. D. Harvey.

JAMES (Clifford S.). **Tropical Myositis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Nov. 30. Vol. 25. No. 3. pp. 177–180.

The author, of the Methodist Mission Hospital, Choiseul, British Solomon Islands, is moved by the communication of Dr. SAYERS [this *Bulletin*, Vol. 28, p. 46] from New Georgia in the same group to record his own observations. The population of Choiseul consists of 4,085 "local natives," most of whom live on the beach and 100 Malaita labourers, figures not very dissimilar to SAYERS'. Among these there were 5 cases of myositis in one year against SAYERS' 19, and 15 microfilarial infections in 204 natives (against Sayers' one in 150), so that Choiseul with a higher filaria rate has less myositis [the figures, however, are too small for any but tentative conclusions].

Some details are given of 10 cases of myositis; in the blood of the 7 examined he failed to find microfilariae. Three cases are described in which myositis followed immediately on the development of pus in septic foci, boils in two instances and abscess under the toe in a third.

A. G. B.

BONNE (C.). Het primaire levercarcinoom. [**Primary Liver Carcinoma.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. Jan. 30. Vol. 76. No 5. pp. 438–445. [2 refs.]

The occurrence of primary liver carcinoma among Javanese and Chinese seems to be definitely much higher than in European races. Various possibilities of statistical selection are considered but will not account for the difference. In the case of the Netherlands Indies the possibility of etiological relationship to infection by *Clonorchis sinensis* or the presence of schistosome eggs in the portal capillaries is excluded. As primary liver carcinoma and cirrhosis are very intimately connected, it may be that in Java alcohol is a causal factor in the production of both conditions. The international list of causes of death unfortunately combines under the same heading cancers of liver and stomach. But while cancer of the liver in Europe is commonly metastatic, secondary to cancer of the stomach, in Java primary cancer of the liver is of high frequency. W. F. Harvey.

MORENO PEREZ (I.). Informe preliminar sobre la epidemia de Muzo en el año de 1931. [**The Epidemic at Muzo in 1931.**]—*Repert. Med. y Cirug.* Bogota. 1931. July. Vol. 22. No. 7 (259). pp. 323–331.

Muzo is a small town nearly 100 miles north of Bogotá, Colombia, in a hilly district 2,000 to 3,000 ft. above sea level. Outbreaks of disease

have occurred there from time to time, four of which are referred to : (1) In 1907, when there were 45 cases, with 6 deaths, reported as yellow fever ; (2) in 1916, when a Commission under GORGAS was sent out by the Rockefeller Foundation, but arrived too late for satisfactory investigations. The members could not find *Aedes* and on the basis of replies to questions concluded that the condition was not yellow fever but malaria ; (3) in 1927 another outbreak took place and was reported as yellow fever, but patients presenting symptoms identical with those so recorded were found to have numerous malaria parasites, mostly *P. falciparum*, in their blood ; (4) in 1931, the outbreak referred to in the title of this article occurred and was also at first designated yellow fever. The National Department of Health sent out men to study it and of the first 22 patients all had malaria parasites. A neighbouring district, Coper, also reported cases (78) but the decision was arrived at that this was influenza with a small admixture of malaria. The total number of patients treated in Muza was 423 [the fatality rate is not stated, but the general impression gained is that it was very low] ; the blood was examined of 397 and parasites were found in 290 or 73 per cent.—227 *P. vivax*, 58 *P. falciparum*, 5 *P. malariae*. Of 407 persons examined 273 (67 per cent.) had enlarged spleens. *Anopheles pseudo-punctipennis* was abundant.

The question whether any of the patients had suffered in previous epidemics is not mentioned, but there occurs the statement that " in 3 weeks 315 new cases were treated and 65 who had been treated previously " ; whether these were instances of second attacks cannot be determined from lack of evidence. The author concludes that " the epidemics which have taken place at irregular intervals in the last 15 years at Muza were not yellow fever but malaria of pernicious form."

H. H. S.

STEULLET (R.). Un cas de parasitisme de l'urèthre par une sangsue *Limnatis nilotica* (Savigny, 1820). [Parasitism of the Urethra by a Leech.]—*Arch. Inst. Pasteur d'Algérie*. 1931. Sept. Vol. 9 No. 3. pp. 481-483.

This leech which is found in South Europe and North Africa is not able to pierce the skin and is therefore a parasite of mucous membranes. Its body is soft like that of the medicinal leech. It has been found in man in the upper air ways, upper digestive tube, vagina and conjunctiva. The patient was a man of 70 years who complained of nothing but bleeding from the urethra. A calculus or other foreign body was suspected but examination revealed nothing and a sound could be passed freely into the bladder. On the 6th day a small red object appeared at the meatus, thought to be a pediculated tumour suitable for operation till the patient presented himself with a leech in his hand which he had pulled out.

A. G. B.

NICOLLE (Charles). La maladie du jeune âge des chiens est transmissible expérimentalement à l'homme sous forme inapparente. Portée de cette constatation. [Dog Distemper transmitted experimentally to Man in Inapparent Form ; Bearing of this Observation.]—*Arch. Inst. Pasteur de Tunis*. 1931. Dec. Vol. 20. No. 3. pp. 321-323.

Though man contracts several diseases from animals we know no animal diseases of human origin. With the possibility in mind of

filling the gap the author inoculated a man, a monkey and a puppy with 5 cc. of defibrinated blood from a puppy infected with distemper virus. The dog had fever after the usual interval and had a proved attack of distemper. The man and monkey had no symptoms of any kind. On the 6th day two puppies were inoculated from the man and the monkey respectively and rigorously isolated. The dog inoculated from the man had fever on the 4th day and two dogs inoculated from it were positive. The dog inoculated from the monkey was unaffected. The bearing of the observation if confirmed need not be laboured. The author supposes that distemper was primitively a disease of man.

A. G. B.

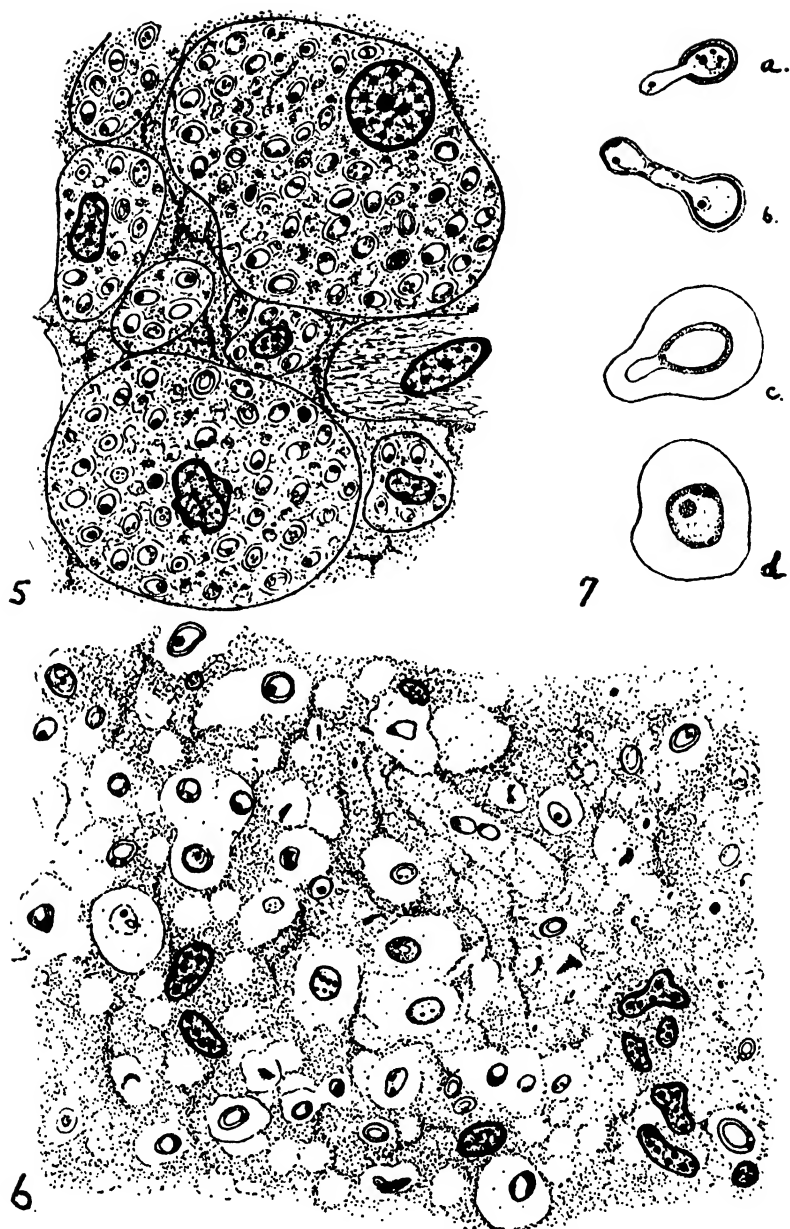
CRUMRINE (R. M.) & KESSEL (John F.). **Histoplasmosis (Darling) without Splenomegaly.**—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 435-449. With 7 text figs. [10 refs.]

This is a careful study and record of another case of the interesting and obscure condition first reported by DARLING in 1906 as an infection by a hitherto unknown organism and designated by him *Histoplasma capsulatum*. There have been only 4 cases previously recorded. The history of this patient is: An adult white man [age not stated] complained of weakness and cough for 6 months, diarrhoea and loss of weight 3 months. The first symptom had been abdominal pain increased by food, but appetite good. He lost 33 lbs. in the 6 months. W.R. negative. When he first came to hospital on April 17th, 1928, nothing abnormal could be felt in the abdomen, but on 23rd May a sausage-shaped mass was obvious and increasing in size, though not tender; it was believed to be a mass of enlarged glands. There was a little fever, but never above 102.5°F. and usually about 101° in the evening, 99° in the morning. Diarrhoea without mucus or obvious blood (test for occult blood was positive) continued and the weakness increased, death occurring on 20th June. Autopsy revealed a mass of discrete enlarged glands, in the abdomen, many caseous, spleen slightly enlarged 12×8.5×4 cm., also with white nodules suggestive of Hodgkin's disease. There was marked ulcerative colitis, 25-30 ulcers 1-2 cm. in diameter and about 50 smaller. Microscopically, the nodes, spleen, liver, ulcers and lungs showed phagocytic cells packed with yeast-like organisms, which bore a superficial resemblance to leishmania bodies but differed in possessing a capsule and having no blepharoplast; there were no giant cells nor acid fast bacilli.

The organism is described in detail; it was found in two stages, a minute intracellular and larger extracellular (see figure). No mycelia were seen, the organisms being yeast-like. It is almost certainly a fungus, not a protozoan, and is better named *Cryptococcus capsulatus* Darling 1906. Attempts at cultivation were unsuccessful.

This case differs from those previously described in the absence of splenic enlargement. This the author explains by saying that perhaps the patient did not live long enough. WATSON's patient (see this *Bulletin*, Vol. 26, p. 804) had complained of cough for 20 years and had an enlarged spleen for 8 years before her death. DARLING's original case, however, was ill for 3 months only, or less than half the one described in this paper, nevertheless the splenic enlargement was a notable feature (see also this *Bulletin*, Vol. 24, p. 68).

H. H. S.



Cryptococcus capsulatus. Intra- and Extra- Cellular Forms.

Fig. 5. Camera-lucida drawing of endothelial cells of lymph node packed with intracellular phases of organism. $\times 1925$.

Fig. 6. Camera-lucida drawing of extracellular encapsulated stages in the spleen. $\times 1925$.

Fig. 7. Camera-lucida sketches of isolated organisms. $\times 3200$.

a and b, budding extracellular forms without capsules; c, budding extracellular forms within a capsule; d, extracellular phase within a capsule, showing characteristic yeast-like structure.

[Reproduced from *American Journal of Tropical Medicine*.]

ROGERS (Leonard). **Result of the Forecast of Cholera, Smallpox and Plague in India in 1931 and Forecast for 1932.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. pp. 61–63.

The results of the forecasts for 1931 are set out in detail for province or district along with the original forecast. This method is followed likewise for these areas in regard to 1932. General forecasts for 1932 are :—

1. Cholera. "The incidence . . . is not likely to exceed the average and will probably be well below it unless the winter rains fail."
2. Smallpox. The incidence should be beneath the average in N.W. India and Central India "during the annual seasonal rise from November 1931 to the monsoon months of 1932."
3. Plague. A "low plague prevalence . . . during the 1931–1932 season" is anticipated.

W. F. Harvey.

LIEURADE. Les "enfants rouges" du Cameroun. [**The Red Children of Cameroon.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 46–48. With 1 text fig.

The children in question were seen in the course of a tour in the Ngaundere district near the source of affluents of the Sanaga river, when the villagers were assembled for vaccination and treatment. Notes were made of 13.

The children, between two and five years, are of both sexes. Attention is drawn to them because of their colour, which resembles that of the cashew nut (acajou clair); the hair is often quite blond. They stand apart, the arms crossed on the chest, shivering. They allow themselves to be moved with indifference. They have sometimes convulsive movements or tics. The head appears large owing to the thinness of the neck and the oedema of the cheeks and eyelids. It is a hard oedema not giving on pressure, the skin over it appears glazed; the eyes appear "black" in consequence of the deep pigmentation of the lids. There is almost always running from the eyes and nose. The abdomen is swollen, with distended veins and ascites. The skin seems to be very thin; the child cannot strike itself at all roughly without bleeding. The limbs are covered with blood-stained scars; the skin of the hands and feet flakes off in places. In parts subject to friction the skin is deeper in colour and, like the cheeks, is glazed. The spleen and liver were never enlarged. The history goes back 18 months and begins with high fever. Depigmentation and the other symptoms come on gradually. Vomiting is frequent. Diarrhoea, in some instances with blood, is not uncommon. The blood did not show any parasites. The children had never left their villages. Their parents and brothers were healthy. The author regrets his inability to study this condition more thoroughly.

A. G. B.

VAUCEL & SALAÜN (G.). Contribution à l'étude du pneumocoque en Afrique Equatoriale Française. [**A Study of the Pneumococcus in French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 58–65.

Thirty-nine strains were isolated from a variety of lesions and twenty-nine were studied in some detail. A large proportion of these

(62 per cent.) belonged, as is usually the case with pneumococci in the tropics, to group 4, but 18 of them (41.4 per cent.) could be allocated to a subgroup for which an agglutinating serum had previously been prepared to a strain sent from Brazzaville. *W. F. Harvey.*

HOPKINS (H. Hanford). **Subcutaneous Nodules of the Juxta-Articular Type.**—*Bull. Johns Hopkins Hosp.* 1931. July. Vol. 49. No. 1. pp. 5-16. With 8 figs. [20 refs.]

In the Syphilis Clinic 14 cases—2 males and 12 females, 9 negroes and 5 whites—were studied. The W.R. was positive in 13; 8 had other clinical manifestations of syphilis. In 12 the nodules were characteristically placed over the extensor surfaces of the forearms near the elbows; 4 had nodules as well over tibial tuberosities. In one the nodes were generalized. In 7 of 8 cases which received regular treatment, arsphenamine plus bismuth, the nodules disappeared. Nodules excised from four cases showed a histological picture not differing from that described by previous observers. In none were spirochaetes revealed. One proved to be a pure xanthoma. A single attempt to infect a rabbit did not succeed.

In the generalized case, a syphilitic with positive W.R. and chronic polyarthritis, nodes were present over occiput, ears, neck, elbows, fingers, sacrum, ischial tuberosities and Achilles tendons and were resistant to treatment. Four of these nodules were excised and exhibited features claimed by students both of syphilis and rheumatism to be characteristic. As they did not respond to treatment the author considers them as of rheumatoid origin. From evidence gleaned from the literature it would appear therefore that J.A.N. may be associated with a number of diseases:—rheumatic fever, rheumatoid arthritis, yaws, leprosy, syphilis, filariasis, scleroderma, acrodermatitis chronica atrophicans, and may be simulated by xanthoma. *H. S. Stannus.*

SAMBON (M.) & ESTAS (P.). Notes sur un cas de nodosités juxta-articulaires. [**Case of Juxta-Articular Nodules.**]—*Bull. Méd. du Kalanga.* 1931. Vol. 8. No. 6. pp. 172, 175-177.

Records a case of J.A.N. at Jadotville, Ruanda-Urundi. No history of yaws or syphilis; W.R. negative. Histologically the picture resembled that now well known. No spirochaetes or other organism found. Intratesticular inoculation into rabbits negative. Injections of cyanide of mercury, N.A.B. and Bi-yatren without effect. *H. S. Stannus.*

BOGGIAN (Bruno). Cutireazione alla tubercolina e malaria. [**Tuberculin Skin-Reaction and Malaria.**]—*Riv. di Patol. e Clin. d. Tubercol.* 1931. July 31. Vol. 5. No. 7. pp. 580-582. [13 refs.]

SEGURA noted in 1925 that at Algeçiras when malaria became more severe the mortality from tuberculosis increased, also that whereas severe malaria "with a tendency to chronicity and quinine resistance" predisposes to and aggravates tuberculosis the benign forms appear to have an immunizing action. MACCIOTTA studying the interrelation at the Royal Institute of Puericulture, Sassari, came to the conclusion that such a predisposition did exist and that it was due to "profound metabolic changes depriving the body of its defences."

The author tested 16 malarious subjects, 3 chronic, 9 benign tertian, 3 subtertian, 1 quartan, and 16 non-malarious in whom no tuberculous infection could be diagnosed by clinical and radiological examination. The results, shown in a table, were: one chronic malaria gave + + +, one + and one —, two benign tertian gave +, as did one of the subtertian; that is of the 16 there were 11 negative, one strongly and four weakly positive. Of the controls 8 gave + + +, 4 gave + + or +, and only 4 were negative. He infers from these results that malaria gives rise to a state "analogous to that present in advanced tuberculosis when the organism is deprived of its antibodies and has no defence against the disease." [A somewhat comprehensive induction on such slender evidence.] H. H. S.

- ABBATUCCI (S.). La maternité en Afrique noire.—*Rev. d'Hyg. et de Méd. Préventive*. 1932. Feb. Vol. 54. No. 2. pp. 95-107. [3 refs.]
- BURTON (A. W.). A Medical Service for Natives in Rural Areas.—*Jl. Med. Assoc. South Africa*. 1931. May 23. Vol. 5. No. 10. pp. 303-307.
- CLARK (J. Tertius). The Bearing of Tropical Experience on the Views of the Pathogenesis of Rheumatic Fever.—*Jl. Trop. Med. & Hyg.* 1931. Sept. 15. Vol. 34. No. 18. pp. 301-303.
- CLELAND (J. Burton). Plants, including Fungi, Poisonous or Otherwise Injurious to Man in Australia. Series III.—*Med. Jl. Australia*. 1931. Dec. 19. 18th Year. Vol. 2. No. 25. pp. 775-778. [16 refs.]
- COOPER (George William). Outline of Culture Character Studies of an Undescribed Species of *Cryptococcus*.—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 97-100.
- CORMACK (E. A.). A Case of Ainhum of the Finger.—*West African Med. Jl.* 1932. Jan. Vol. 5. No. 3. p. 46. With 1 fig.
The little finger. Both little toes had been lost from the same cause.
- GRASSET (E.) & ZOUTENDYK (A.). Immunological Studies in Reptiles and their Relation to Aspects of Immunity in Higher Animals.—*Publications of South African Inst. Med. Res.* 1931. Nov. Vol. 4. No. 29. pp. 377-460. With 28 figs. on 15 plates.
- HAY-MICHEL (A.). Medical Services for Rural Areas.—*Jl. Med. Assoc. South Africa*. 1931. Sept. 12. Vol. 5. No. 17. pp. 555-558.
- LEDENTU. Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat, pendant l'année 1929.—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.-Nov.-Dec. Vol. 29. No. 4. pp. 661-851.
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BUREAU OF HYGIENE AND TROPICAL DISEASES.

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[No. 8.

LEPROSY.

LOWE (John). **Leprosy in India. The Present Outlook.**—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 208-210.

This is a carefully considered review of the leprosy problem in India based on eight years' experience of about 5,000 cases seen and 3,000 treated, with the great advantage of most of them being under close observation in the Dichpali Leper Institution. The author rightly deprecates both the unwarranted pessimism of some British writers and over optimism of a S. Indian non-medical man, whom he quotes as stating "Within a few years this dreadful disease may become a thing of the past." He agrees that the disease is acquired by contagion, is not highly infectious and is predisposed to by bad social and hygienic conditions, and there are probably at least 1,000,000 lepers in India. After pointing out that advanced cases tend to accumulate in an institution to the detriment of good results, he deals with 464 cases treated for from six months to eight years. He brings out the interesting point that after treatment the nasal mucous membrane became negative as regards bacteria in 221 out of 309 originally positive cases, but the skin became negative in only 65 of 393 cases, and that the bacilli persist in small numbers here in cases which have become inactive especially in C3 (advanced skin) cases. He concludes that as the result of prolonged treatment (1) almost every case of the disease ceases to progress; (2) in some, mostly early cases, no bacilli or activity remain; and (3) in more advanced cases progress is arrested, the lesions decrease, the nasal discharge can be rendered free from bacilli, thus much diminishing infectivity, and the disease becomes inactive, although acid-fast bacilli may remain in the skin. He points out that compulsory segregation for India's million lepers is impossible, and that the present propaganda and survey work is valuable, but that the out-patient clinic treatment is handicapped by the difficulty in getting regular attendance for sufficiently long periods. It will require therefore much patient work to reduce leprosy materially in India, and further research is necessary to furnish still better methods of control.

L. Rogers.

LEPROSY IN INDIA. 1932. Jan. & Apr. Vol. 4. Nos. 1 & 2. pp. 1-49; 51-120. With 3 figs. & 4 maps in text. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

In these issues the following are the most interesting points. E. MUIR reports on a trial in the Purulia Leper Colony of Solganal B₂—so long advocated by A. PALDROCK as a specific for leprosy—which can be given intramuscularly. Among fourteen cases treated with the aid of control sedimentation tests not a single one showed any improvement, and in no less than eight the injections had to be stopped on account of injurious effects, including bad reactions, exhaustion, progressive weakness, etc. Moreover, so far from being beneficial in eye complications, as claimed, it proved harmful by inducing dangerous reactions, and setting up intraocular inflammation in three cases. This treatment was therefore found progressively to lower the patient's general resistance and it is considered to be dangerous.

The intradermal leprolin test advocated for diagnostic purposes by BARGEHR has been tried by R. G. RAO with leprolin prepared from both a normal non-reacting and from a reacting case, but it was not found to be of any specific value, for intradermal injections of sterile salt solution sometimes produced similar reactions.

A survey in the Midnapore district of Bengal by K. R. CHATTERJI revealed four times as many cases as were previously known. House infection accounted for 54·7 per cent. and association 22·8 per cent. A clinic was opened and 60 per cent. of the discovered cases enrolled, and among these the average daily attendance was 80 per cent. In another survey in the Kangra Valley district a history of previous contact with a leper was obtained in 80 per cent. of the cases.

E. MUIR records instances of infection of the higher castes through the employment of low caste lepers for milking and shaving. He also deals once more with the value of potassium iodide only in recovering cases with negative bacteriological examinations of the nose and skin.

L. R.

LULL (George F.). **Leprosy in the Philippine Islands.**—*Milit. Surgeon*. 1932. Feb. Vol. 70. No. 2. pp. 138-144. With 1 text fig. [15 refs.]

This is a brief account of the well-known history of the Culion leper settlement and the recent establishment of local leper hospitals and skin dispensaries. The importance of improvement in diet is noted, and the best results of ethyl ester chaulmoogra treatment have been obtained in children with 54 per cent. of 70 cases becoming negative, and 67·5 per cent. of slightly advanced cases. Since intensive treatment has been used at Culion and at various treatment centres 2,448 lepers have been released as negative. Since 1907 \$20,000,000 (about £4,000,000) have been spent by the Philippine Government on the segregation and care of lepers—a high proportion of the total public health budget.

L. R.

RODRIGUEZ (José). **Leprosy in Cebu, I.**—*Philippine Jl. Sci.* 1931. July. Vol. 45. No. 3. pp. 459-481. With 2 text figs. (1 map).

This full report begins with the geographical and climatic conditions of the Island of Cebu, where leprosy is very prevalent, although the

climate is described as being "dry" with a rainfall of 1,500 mm., or 60 inches a year, and this is said to disprove the theory of ROGERS that there is a close relationship between the prevalence of leprosy and a heavy rainfall. [In Rogers' map of the world distribution of leprosy high rates were shown in just those warm areas with 60 inches of rain and upwards, and the tropical areas with little or no leprosy had less than 10 inches annually.] Historically the old statement ascribing the origin of leprosy in the Philippines to the introduction of 130 Japanese lepers in 1630 is disproved by the fact that cases were being cared for in Cebu as early as 1570, but the disease has spread rapidly during the last few decades with improved communications. Several attempts to found leper hospitals or colonies were made during the nineteenth century, but since 1907 the lepers have been sent to Culion in large numbers. The incidence in the 52 Cebu municipalities varied from 0.4 to 26.4 per mille, the worst areas being within 20 kilometres of the capital town. L. R.

DENNEY (O. E.). **The National Leper Home (United States Marine Hospital), Carville, La. Review of the More Important Activities during the Fiscal Year ended June 30, 1931.**—*Public Health Rep.* 1932. Mar. 11. Vol. 47. No. 11. pp. 601-613.

This report for 1931 records an annual increase in the voluntary admissions as the result of the great care the patients receive there; 63 new cases were admitted bringing the total number to the highest yet recorded, namely 337. The deaths amounted to 23 and 19 were paroled. Treatment continued on former lines and no less than 96 per cent. of 180 on chaulmoogra-oil-benzococaine showed from slight to marked improvement. Three of four patients who received vaccinated calf serum intramuscularly for two years are now bacteriologically free, and all such cases show clinical improvement but "no conclusion of specific effect can be made." With chaulmoogra treatment in both early and advanced cases about 50 per cent. improved, but no change was more frequent in advanced cases. Generalized lepra reactions with fever were not more frequent than might be expected in untreated cases. The activities of the neuropsychiatric, orthopaedic, dental, laboratory, nursing and dietetic services were maintained with good effects, and it is noteworthy that since a number of patients have been paroled "mental depression is now infrequent, while a general state of hopefulness prevails." The work at Carville is to be envied by poorer countries with vastly more lepers to provide for. L. R.

HADDAD (E.). **Contribution à l'étude de la lèpre au Kasai (Congo Belge) d'après 127 cas observés en pratique itinérante.** [**Leprosy in the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 311-313.

This is a brief account of a tour in an area of western Belgian Congo during which 127 lepers were seen among about 5,000 people, of whom 6 per cent. appear to have been infected conjugally, and 42 per cent. by close contact with lepers. The author thinks the true number of lepers is over 10 per cent. in some areas. L. R.

TALOTTA (Giuseppe). La lebbra in Eritrea. [**Leprosy in Eritrea.**]—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 193–199. English summary (6 lines).

With a view to attacking seriously the problem of leprosy in Eritrea a census has been undertaken and so far, in a seven months' investigation, 559 patients have been noted. This figure does not by any means represent all the cases for there is a considerable number of nomads who have evaded examination. After discussion the authorities have decided not to erect a leprosarium, but to found a colony where the patients can be properly housed and attended to. *H. H. S.*

HOFFMANN (W. H.). Lepraheim Spinalonga. [**Leper Home in Spinalonga (Crete).**]—*Dermat. Woch.* 1932. Apr. 2. Vol. 94. No. 14. pp. 477–480.

The author calls attention to the description given by Dr. MEISSEL in the *Muenchener Medizinische Wochenschrift*, 1931, No. 36, p. 1530, of the state of the Leper Home at Spinalonga in Crete, which is so gruesome as to be comparable with Dante's inferno; the colony is considered to be a danger to Eastern Europe. He points out that there is no excuse for such a state of affairs in which the patients do not receive the benefits of the modern treatment of leprosy by injections of pure chaulmoogra oil preparations, by means of which lepers not extremely advanced can be cured in the sense of being rendered free from the symptoms, discomfort and infectivity of the disease, and relapses can be obviated by regular medical supervision. Action should be taken by the Leprosy Commission of the League of Nations to put an end to the discreditable state of affairs at Spinalonga. *L. R.*

BURNET (Et.). La lèpre à la Société des Nations. Nouvelle phase de la lutte contre la lèpre. [**New Phase of the Leprosy Campaign by the League of Nations.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1932. Mar. Vol. 54. No. 3. pp. 161–182.

The author is secretary to the Leprosy Commission of the League of Nations and he here gives a general review of the question based on his experience during his world-wide tours. He points out that the rigid compulsory segregation methods of the middle ages are incompatible with modern ideas, and that modern treatment by chaulmoogra derivatives must now play a great part in the campaign against leprosy. Opinion however still differs widely, from strong support of segregation as the principal measure in Japan, to the Indian system of propaganda-treatment-survey with much reliance on early treatment in out-patient clinics at a minute fraction of the cost of segregation, while in the Philippines compulsory segregation at Culion is now supplemented by treatment hospitals near large towns and skin clinics for early out-patient treatment. In South America and in Hawaii segregation with treatment is mainly relied on. The latter part of the paper deals with the conclusions arrived at by the Conferences at Bangkok in December 1931 and at Culion in January 1931, and the formation of the International Leprosy Society. These have already been recorded in this *Bulletin*. *L. R.*

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. **The Empire's Open Sore: being the Annual Report for 1931.**—32 pp. With 12 figs. & 1 chart. London: 29 Dorset Square, N.W.1.

Work has been continued on the same lines as before, a general, popular account of which is recorded. Close on 550,000 doses of hydnocarpus preparations were sent out during the year, the highest total so far, at a cost of £900, and a total of £2,410 was expended in grants to seven African tropical areas with the approval of local Directors of Medical Services. The number of lepers in the British Empire is estimated to be 1,250,000. L. R.

AUSTIN (C. J.). **Leprosy in Children. (A Study of 100 Cases in the Central Leper Hospital, Makogai, Fiji.)**—*Jl. Trop. Med & Hyg.* 1932. Apr. 15. Vol. 35. No. 8. pp. 113–118.

During 19 years among 1,450 admissions to the Fiji Leper Hospital at Makogai 105 were children under 15 years of age. A study of the records of these cases was made in the hope of finding early cases, and it was found that the proportion of children to adults has steadily increased from 2.72 per cent. in the first five years to 12.32 per cent. in the last few years; an encouraging sign of growing confidence in treatment attracting more early cases. The sexes were about equal, 54 per cent. were neural, 21 cutaneous and 25 of mixed type. Cases were only discharged on parole after being bacteriologically negative for two years, and 2 of the 14 relapsed. No less than 61 of the 105 gave a history of one or more leper relatives numbering from 2 to 19, although fear of their relatives being segregated tended to understatements. "It would be difficult to find a more cogent argument for the necessity of frequent and thorough examinations of family contacts." L. R.

RODRIGUEZ (José). **Studies on Early Leprosy in Children of Lepers, II. Re-examination of Cases after Five Years.**—*Philippine Jl. Sci.* 1932. Feb. Vol. 47. No. 2. pp. 245–258.

This is an important account of the re-examination of cases of leprosy in children five years after treatment at the Culion leper settlement. Early attempts to separate the children born at Culion from their leper parents in infancy proved so fatal to the infants that it had to be postponed until they were weaned, so they were only separated at from 6 months to 11 years of age, and observed for four years before being released, with the result that 23 per cent. of 123 so isolated up to 1924 developed leprosy, indicating early infection. After a survey in 1924 children above two years of age, negative bacteriologically, but often with early signs of leprosy, were sent to Manila, and by 1926, 71 out of 289 had died, many of epidemic dysentery, and others were sent to relatives. Improved conditions at Culion now allow of the safe isolation of infants from birth. A 1929 survey of 336 children examined in 1924, whose records could be traced, showed that 50 had been rendered negative and been paroled, 31 were still lepers, 56 had died, 90 were still under observation and 106 had been discharged to the care of relatives or guardians. Of the 90 still under observation 68 were non-lepers, 5 were negative or arrested, 13 had suspicious signs and 4 stationary lesions which had never been positive bacteriologically.

A table showing the number of children who had become positive between 1922 and 1929 showed 24, 22, 16 and 14 in the years 1922 to 1925, but only 2, 3, 2, 2 in 1926 to 1929. The great recent fall is attributed to (1) there being fewer children under observation, (2) intensive treatment of "clinical lepers," (3) transfer of the older children to Manila, and "most important of all, (4) the early segregation of the younger ones in the nursery at Balala." In ten of the 85 cases becoming positive undoubted clinical signs were present three months to four years before the bacilli were found, and in no less than 37 suspicious or definite clinical lesions were present for from a few months to four years before becoming positive, but in 24 typical positive lesions appeared suddenly. In 30 children with suspicious macules these lesions became positive later in 24. Among 51 children with undoubted clinical lesions, but negative bacteriologically, of 20 seen in 1922, eight, or 40 per cent., had become positive by the end of 1924 in the absence of treatment, but of 31 cases seen in 1924 only 2 progressed to the positive stage; a great decrease since 1924 "due largely to antileprotic treatment." On the other hand children with "suspicious" lesions, including pale macules or depigmented patches and also "a characteristic flushed, tense, glistening appearance on the front of either one or both legs of children below the age of 2 years," the "Nicolas sign," later developed definite signs of leprosy in 57 per cent. of 58, but only 12 per cent. out of 206 with no signs whatever developed leprosy later. Moreover, it was found that of 83 "suspicious" cases treated for an average of fourteen months 70 or 84 per cent. remained suspicious while 10 or 12 per cent. became clinical or positive lepers, but it is important to note that they were all living with their leper parents and so continuously exposed to reinfection. On the other hand, of 63 "suspicious" children transferred to Welfareville, away from their parents, and 5 "clinical lepers," in 42 the lesions had subsequently cleared up. It is therefore held that "prophylactic treatment" is useless and unscientific.

L. R.

LIPSCHITZ (L. A.). La réaction Costa dans la lèpre. **Value of Costa's Reaction in Leprosy.**—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 3. pp. 147-150. [6 refs.] [In Russian. French summary.]

The author used Costa's reaction with the object of ascertaining its value in the diagnosis of leprosy. The cases were divided into three groups: (1) those with slight; (2) with medium; and (3) with grave lesions. Cases in which leprosy phenomena were absent were classed as negative. The reaction was positive in 68 out of 100 cases. In the third group over 90 per cent. of cases manifested a marked positive reaction, in the second group the percentage was 75, and in the first 34.7. As regards the influence of the type of disease, positive reactions were relatively rare in the nervous form of leprosy, while the nodular form showed the greatest number of positive results. The reaction was negative in recent cases, becoming positive only after one year. The maximum number of positive reactions was observed in cases of 6-10 years' duration. Treatment diminishes the percentage of positive reactions. Age and sex have no influence upon the degree of reaction.

C. A. Hoare.

MITRA (P. N.). **A New Method of Diagnosis of Leprosy.**—*Indian Jl. Med.* 1932. Feb. Vol 13. Pt. 1. pp. 1-2.

The author states that when 5-10 cc. of blood were withdrawn from a vein into 1 per cent. sodium citrate in distilled water, and the sediment obtained by centrifuging was smeared on a slide, and thick films stained with Ziehl-Neelson and methylene blue, acid fast bacilli were found in the blood in 21 out of 26 cases of both cutaneous and nerve cases, but not in non-leper controls. *L. R.*

MANALANG (Cristobal). **Significance of Pathologic Findings in Biopsy Materials from Lepers. Preliminary Report.**—*Monthly Bull. Philippine Health Serv.* 1931. Dec. Vol. 11. No. 2. pp. 633-638.

———. **Transmission of Leprosy.**—*Ibid.* pp. 639-640.

In the first of these short notes the microscopical changes are recorded in 33 cases of leprosy. In the second the author states his opinion that the evolution of the disease up to the appearance of clinically recognizable lesions takes many years, during which a non-infective non-acid-fast stage of the lepra bacillus is present. *L. R.*

LOWE (John) & CHRISTIAN (E. B.). **Bacteriological Examination in Leprosy. A Study in the Efficiency of the Various Methods in Common Use.**—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 867-872. With 7 figs. on 2 plates.

As the result of the examination of 160 cases these workers conclude that nasal examination showed the bacilli in only the number of cases that skin examination showed them, and nasal scraping was more efficient than smears. Skin examination by either the split or clip method is far better than nasal examination, but most positive results were obtained by the clip method in the lobe of the ear, and only four cases showed bacilli elsewhere and not in the ear lobe.

L. R.

MORTA (Joaquim). **Lepa tuberculoide. [Tuberculoid Leprosy.]**—*Folha Med.* 1932. Jan. 25. Vol. 13. No. 3. pp. 25-30. With 4 text figs.

Descriptions are given of the various forms which this condition may present; sometimes with well defined reddish edges, with little infiltration, slight branny desquamation, the lesions often no larger individually than a pin's head but at times becoming confluent or gathered in patches though remaining discrete; some closely resemble the lesions caused by Trichophyta, others are like lupus. They differ from the usual leproma in containing bacilli in small numbers only, this difference being ascribed to varying degrees of allergy, the "tuberculoid reaction" being produced when the organisms are gradually autolysed by the action of antibodies, i.e. when there exists a certain degree of immunity. The paper is illustrated by photographs demonstrating the commoner forms of the lesion. *H. H. S.*

RABELLO, Jr. [In Portuguese & English] Eritema polimorfo e patologia da lepra : lesão inicial, alergia, surtos agudos. **On Erythema Exs. Multiforme and the Pathology of Leprosy. Primary Lesion, Allergy, Acute Exanthemata.**—*Rev. Med.-Cirurg. do Brasil*. 1931. Dec. Vol. 39. No. 12. In Portuguese pp. 405-420. In English pp. 420-434.

This is mainly a summary of the literature on this much discussed subject from which the author concludes that the appearance of new Erythema multiforme lesions in the course of leprosy is an allergic phenomenon and a good prognostic sign, although some think otherwise.

L. R.

ROY (Ashutosh). **Relapse of Active Signs in "Burnt-out" Cases of Leprosy.**—*Indian Med. Gaz.* 1932. Jan. Vol. 67. No. 1. pp. 12-13.

The author records four cases out of over 300 classed as "burnt-out," or arrested, cases in the large Purulia Leper Colony in India in whom the disease recurred, in each instance, following surgical operations.

L. R.

DUBOIS (A.). La cuti-réaction à la tuberculine chez les lépreux. (Note préliminaire.) [**The von Pirquet Reaction in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 1-4.

The author has studied this reaction in both lepers and in non-lepers in the Belgian Congo by von Pirquet's method, but he did not find that the former gave more reactions than the latter, for 126 of 551 lepers, or 22.8 per cent. reacted, against 657 of 3,041 non-lepers, or 21.6 per cent. He concludes that a positive tuberculin reaction in a leper is indicative of tubercular complication.

L. R.

CHIYUTO (Sulpicio) & VELASCO (Felix). **Observation of Seven Hundred Fifty-Eight Quiescent, or Arrested, Cases of Leprosy Released from Isolation.**—*Jl. Philippine Islands Med. Assoc.* 1931. Dec. Vol. 11. No. 12. pp. 457-468. [6 refs.]

This is an important study of 758 cases of quiescent or arrested cases of leprosy released from isolation in Manila and the neighbouring provinces from 1922 to 1930. Many could not be traced but the 78.5 per cent. followed up was higher than expected under the difficult conditions of work. Table 3 below shows the results in those followed up successfully; 66.9 remained quiescent and 33.1 per cent. had become active again, while another table shows that of 735 cutaneous cases 542 remained quiescent, and of 23 neural ones 21 showed no recurrence of active signs. Length of treatment during isolation did not appear to affect the results, but preparations made from *Hydnocarpus wightiana* oil gave better results than the earlier used *Taraxogenus kurzii* oil, with 65.8 per cent. of relapses with the true chaulmoogra oil and only 45.1 per cent. with the hydnocarpus oil. They conclude that the average number of relapses varies between 32.9 per cent. and 46.4 per cent. according to the frequency with which the lepers continue regular treatment and their conditions of living. The

TABLE 3.—Showing the Frequency of Cases becoming Active and remaining Quiescent among those Released from Isolation.

Period of observation.	Total or average.			
	Number		Percentage	
	Active	Quiescent	Active	Quiescent
Less than 1 year ...	33	125	20·8	79·2
1 year to 2 years ...	43	140	23·5	76·5
2 years to 3 years ...	44	61	41·9	58·1
3 " 4 "	26	31	54·4	45·6
4 " 5 "	22	18	55·0	45·0
5 " 6 "	14	10	58·3	41·7
6 " 7 "	10	7	58·8	41·2
7 " 8 "	3	5	37·5	62·5
Over 8 years ...	0	0	0	0
Total or Average ...	195	397	33·1	66·9

percentage of relapses increases with the length of parole after release. An agricultural colony for released cases is advocated to allow of continued treatment and observation.

L. R.

DIKSHIT (B. B.). **Alepol in Leprosy.**—*Indian Med. Gaz.* 1932. Jan. Vol. 67. No. 1. pp. 7-12. With 2 graphs in text.

The author is professor of pharmacology and he has tested the use of Rogers' alepol (sodium hydnocarpate of B. W. & Co.) in place of the whole oil or ethyl esters in the same manner as MUIR uses the latter. Alepol has a less local irritant effect than other salts of hydnocarpus oil and its haemolytic action may be diminished by dissolving it in Locke's solution. The treatment was controlled by sedimentation tests. His conclusions are :—

" (1) Alepol, a soap derived from the lower-melting-point fatty acids of the hydnocarpus oil, was used in the treatment of 200 cases of leprosy.

" (2) The drug is given by intramuscular injections in the beginning and later by intravenous injections. The strength for the former is 3 per cent. and that for the latter 1 and 2 per cent. For intravenous injections Locke's solution without glucose is used to dissolve the drug, instead of distilled water.

" (3) Improvement is seen most in A₁ and A₁ B₁ types. B cases become stationary and improve very gradually. They become bacteriologically negative after a few months' treatment.

" (4) The Wassermann reaction was positive in 70 per cent. of the cases, and more than 70 per cent. of the cases were infected with leprosy before the age of 40.

" (5) The clinical results obtained with Alepol compare favourably with those contained with hydnocarpus oil."

L. R.

PEIRIER (M.). Injections intraveineuses de chaulmoograte de soude. [**Sodium Chaulmoograte for Intravenous Administration.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.-Nov.-Dec. Vol. 29. No. 4. pp. 852-860.

The preparation used consists of the soaps of the whole of the fatty acids of the oil, so it contains much sodium hydnocarpate.

Various difficulties were met with in preparing an isotonic and un-irritating solution, a description of which makes up most of the paper, with the result that the following prescription was eventually adopted for intravenous injections.

Chaulmoograte of Soda three parts saturated	...	10 grams.
Saccharose	... ..	47 do.
Antipyrine	... ..	25 do.
Distilled water add to	... ..	1,000 cc.
L.R.		

MUIR (E.). **The Intradermal Method of injecting Hydnocarpus Preparations in Leprosy.**—*Indian Med. Gaz.* 1932. Mar. Vol. 67. No. 3. pp. 121–124. With 3 text figs.

The greater activity of intradermal than of intramuscular injections is emphasized and the ethyl esters are preferred for the former method as they are less quickly absorbed. Illustrations are given of the effects of the ethyl ester on one side and of 3 per cent. sodium hydnocarpate on the other in support of this opinion. The esters mixed with 4 per cent. creosote proved least irritating on intradermal injection. A practised worker is said to be able to give some 100 punctures in a couple of minutes with infiltration of 5 to 6 cc. in an area of 14 square centimetres in half minim doses at each point. L. R.

COLE (Howard Irving). **Causes of Irritation upon Injection of Iodized Ethyl Esters of Hydnocarpus-Group Oils.**—*Philippine Jl. Sci.* 1931. Nov. Vol. 46. No. 3. pp. 377–382.

The author is chief chemist at Culion and he has carried out careful experiments to ascertain the best way to make ethyl ester hydnocarpace that will be as unirritating as possible on intramuscular injection. He found that a low pan type of vessel is preferable to a high one for iodization, occasional stirring is advisable during the process and that sunlight or heat in the presence of air soon changes the iodized esters into an extremely irritating product. L. R.

PALDROCK (A.). **Zur Behandlung der Lepra mit Fuadin, Neostibosan und R 103. [Leprosy treated with Fuadin, Neostibosan and R 103.]**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Mar. Vol. 36. No. 3. pp. 135–140.

The author reports on 12 cases of leprosy treated by what he regards as his "specific" method by local application of carbonic acid snow, with the addition of one of the antimony preparations or a gold preparation of Dr. A. W. COLLIER known as R 103. On treating fixed preparations of leprosy nodules with $\frac{1}{4}$ per cent. solutions of these three drugs he found that after three hours the lepra bacilli had become Gram negative, and this he regarded as indicating that they should be of great value in the treatment of leprosy. Unfortunately his trials of them combined with CO₂ treatment and daily radiation with cold red light, and controlled by the sedimentation test, showed

only slight improvement in half of six cases in which R 103 was used, and his general conclusion is that the results of these three "un-specific" drug treatments could not be looked on as favourable.

L. R.

CRUZ (M. C.), ABUEL (Jose I.) & SAMSON (José G.). **Periarterial Sympathectomy in Trophic Ulcers of Leprosy: Preliminary Report.**—*Jl. Philippine Islands Med. Assoc.* 1931. Dec. Vol. 11. No. 12. pp. 474-476.

Thirteen cases are reported of the performance of this operation in the femoral region for perforating ulcers, with the immediate good effect of healing of the ulcers on the side operated on in 10 to 30 days; but in 8 the ulceration recurred in 10 to 75 days.

L. R.

- i. MCKINLEY (Earl B.) & SOULE (Malcolm H.). **Studies on Leprosy. Experimental Lesions in Monkeys and Cultivation of *Bacillus leprae*.**—*Jl. Amer. Med. Assoc.* 1932. Jan. 30. Vol. 98. No. 5. pp. 361-367. With 6 text figs. [12 refs.]
- ii. SOULE (Malcolm H.) & MCKINLEY (Earl B.). **Cultivation of *B. leprae* with Experimental Lesions in Monkeys.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 1-36. With 13 text figs. and 4 coloured figs. on 3 plates. [24 refs.]

This is a careful study of a difficult question. After brief references to the cultivation of diphtheroids and acid-fast chromogenic bacilli from leprous material by 22 previous workers, and to attempts to infect animals, with occasional apparent success in the case of monkeys, they describe their work at Porto Rico in the inoculation of eight young *Macaca rhesus* and five *Cebus olivaceus* monkeys intradermally with 0.25 gm. of an emulsion in normal saline of freshly removed leprous nodules. In three of the first and in all five of the second species nodular lesions developed at the site of inoculation in 18 to 20 days, and granulation tissue with acid-fast bacilli was found in one nodule removed after ulceration had occurred. After increasing in size for a week or two the lesions regressed and disappeared in another three to four weeks, as was found by REENSTIERNA.

They also report attempts to cultivate *Myco. leprae* from freshly removed nodules implanted on various media and kept in various gaseous atmospheres, with occasional positive results, which were never uniform under any one set of conditions. The best results were obtained with glycerol potato, egg containing and hormone glycerol agar mediums, and the most favourable gaseous environment seemed to be 40 per cent. O₂ plus 10 per cent. CO₂, but only negative results were obtained under anaerobic conditions plus CO₂. These results confirm those of SHIGA and WHERRY obtained recently. The growth from 16 tubes was suspended in normal saline and inoculated into monkeys with the production of small granulomatous nodules in 10 out of 17 animals, but with early disappearance of the bacilli from the tissues. They discuss the possibility of the lesions being produced by the toxins of dead bacilli.

L. R.

OLIVER (Wade W.), DE LEON (Walfrido) & DE RODA (Alfredo Pio). **The Attempted Cultivation of *Mycobacterium leprae*.**—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 611–625. With 2 figs. on 1 plate.

The authors have repeated but with entirely negative results, the work of WHERRY and of SHIGA, which led them to claim to have cultivated the leprosy bacillus [see this *Bulletin*, Vol. 27, p. 339, Vol. 28, p. 332]. They obtained persistence of the organisms up to 158 days in one instance in an original partial oxygen tension culture on 4 per cent. glycerine chicken bouillon sweet potato, but no multiplication could be shown in either primary or secondary cultures. The shortest persistence was from 14 to 43 days. L. R.

EICHBAUM (Franz). Erfahrungen und Beobachtungen an säurefesten Stäbchen (Wasserbakterien, Leprabazillen, Tuberkelbazillen). [On Acid Fast Bacilli.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 1/2. pp. 31–55. [57 refs.]

Recent work by SHIGA and others has enabled a certain degree of multiplication of the leprosy bacillus on artificial media to be obtained, but subculture through several generations has not yet been achieved. After discussing the recent literature the author records that after trying 50 culture media he obtained the best results with a potato one, on which he satisfied himself that a certain amount of multiplication occurred on the first two passages and perhaps for a third. When the bacilli become scarcer in subcultures they are only carried over mechanically. L. R.

VAUDREMER (A.), SÉZARY (A.) & BRUN (C.). Culture de germes provenant de lépromes et de rate lépreuse filtrée. [Cultivation of Organisms from Leprotic Tissue.]—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. pp. 624–626.

The authors report four years' work on the cultivation of the lepra bacillus in a filtrate of a culture of *Aspergillus fumigatus* to which was added a piece of removed leprous tissue as recorded in a previous paper. They now report similar growth from a filtrate of a leprous spleen passed through a bougie L3 inoculated into bouillon, potato, glycerine potato and on ordinary gelatine; after being apparently sterile for nine months Gram staining pseudo-meningococcus appeared, and these developed first into cyanophile bacilli and later into acid-fast bacilli, which they regard as the bacillus of Hansen grown from an element which will pass through bougie L3. L. R.

CANTACUZÈNE (J.) & LONGHIN (S.). De l'existence d'un ultra-virus chez le bacille de la lèpre humaine. [A Filtrable Stage of *Mycobacterium leprae*.]—*C. R. Soc. Biol.* 1932. Apr. 13. Vol. 109. No. 11. pp. 1003–1004.

The authors report that they have proved the existence of an ultra-virus stage of the lepra bacillus through animal inoculations.

An emulsion of lepra bacilli from a nodule was passed through a L3 bougie and inoculated into the peritoneal cavity of six white rats, and in two of them killed after two months, in macroscopical lesions on the peritoneum acid-fast bacilli were demonstrated. *L. R.*

OTA (M.) & SATO (S.). Reproduction de la lèpre chez les rats blancs par l'inoculation de lépromes en émulsion. [**Inoculation of Leproma Emulsions into White Rats.**—*C. R. Soc. Biol.* 1932. Jan. 22. Vol. 109. No. 2. pp. 75-77. With 1 text fig.

These authors report on the inoculation of white rats with acid-fast bacilli grown from leprous nodules inseminated on the media of Petragami or of Löwenstein for a month, during which the organisms were found to have multiplied remarkably. The rats after inoculation were fed on a diet deficient in vitamin B, and in two out of seven small nodules appeared on the cheek and nose and increased to the size of peas with the development in them of numerous acid-fast bacilli, while in one ulceration of the nose was produced. *L. R.*

CILENTO (R. W.) & NORTH (E. A.). **Human and Murine Leprosy in Tropical Australia: Preliminary Notes and Observations.**—*Med. Jl. Australia.* 1931. Dec. 19. 18th Year. Vol. 2. No. 25. pp. 767-775. [21 refs.]

After references to earlier work on rat leprosy in Australia and elsewhere, the authors record that experimental work at Rockhampton in Queensland furnished no convincing evidence of a connexion between human and rat leprosy. Emulsions of excised rat leprosy nodules were injected into forty young male white rats and in a number of them lesions containing acid-fast bacilli were produced by both intraperitoneal and subcutaneous injections. Cultures were also made from rat leprosy material, but in one instance only was an acid-fast bacillus obtained in both primary and secondary culture tubes of Dorset egg medium, with which typical lesions were produced in six young rats inoculated with a subculture. Other rats were inoculated intraperitoneally with emulsions of human leprosy nodules transported packed in ice, but with negative results. *L. R.*

KOCH (Franz). Die Rattenlepra und ihre Bedeutung für Klinik, Pathogenese und Therapie der menschlichen Lepra. [**Rat Leprosy and its Significance for the Disease in Man.**—Reprinted from *Zent. f. Haut- u. Geschlechtskrankh.* 1932. Vol. 40. pp. 433-444. [1 page of refs.]

This paper consists mainly of a good account of the literature of rat leprosy. The author thinks some negative results of inoculation experiments were due to the incubation period often being very long. He notes that several workers obtained apparent cures of rat leprosy following breaking down of the nodules under chaulmoogra treatment. He has tried treating white rats infected by inoculation into the right groin of portion of leprous granulomata from wild rats with

subcutaneous injections of hydnocarpus esters, with breaking down of nodules after eight days treatment, but after stopping the treatment the disease spread again, and the same happened after solganal B treatment. He thinks these animals will be of value in testing drugs for use in human leprosy. L. R.

OHTAWARA (T.) & ICHIHARA (T.). Studium der Lepra. I. Mitteilung. Statistische Betrachtung der Rattenlepra. [**Studies in Leprosy. I. Statistics of Rat Leprosy.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Feb. 3. Vol. 123. No. 7/8. pp. 495–503. [27 refs.]

After references to literature on the subject of rat leprosy, these workers record their investigations in Japan in a series of tables. From these they conclude that 281, or 27.9 per cent., of 1,007 rats caught in Kumanoto were affected by this disease, mostly full grown animals, although they are often infected in their youth. The rat leprosy bacillus resembles that of the human disease. Both sexes are equally attacked. The disease was most frequent in rats caught in grain stores, and those of greengrocers and other similar traders, so they think the germs are most likely to be transmitted through grain and vegetables or from the earth. L. R.

WOOLEY (Jerald G.) & ROSS (Hilary). **Calcium, Phosphorus, and Protein Metabolism in Leprosy. A Study of the Total Calcium, Diffusible and Nondiffusible Calcium, Phosphorus, Total Proteins, Albumin, and Globulin in the Blood Serum.**—*Public Health Rep.* 1932. Feb. 12. Vol. 47. No. 7. pp. 380–389. [12 refs.]

The authors compare the results of their chemical analyses of the sera of six healthy young men with those of 46 lepers in various stages of the disease. They conclude that in leprosy "The albumin-globulin ratio and the diffusible calcium, as well as the percentage of diffusible calcium, averaged considerably lower in the lepers than in the normal young men; the globulins and non-diffusible calcium averaged higher than in the controls. Three cases showed normal values throughout all determinations as compared with old controls." L. R.

UYEI (Nao) & ANDERSON (R. J.). **The Chemistry of the Lipoids of Tubercle Bacilli. XXVI. Separation of the Lipoid Fractions from the Leprosy Bacillus.**—*Jl. Biol. Chem.* 1932. Jan. Vol. 94. No. 3. pp. 653–660. [14 refs.]

The authors have applied the chemical methods used by them in work on the tubercle bacillus to a large quantity of material derived from 3,000 cultures of an acid-fast bacillus originally isolated from a case of human leprosy in Honolulu about 1909, and known as the Hygienic Laboratory strain No. 370 (Apa case) of *Mycobacterium leprae*, and which they regard as the causative organism of leprosy. Their results are well shown in the following table in contrast with a similar examination of tubercle bacilli.

Substances isolated from *Bacillus leprae*.

	Bacillus leprae 3,000 cultures		Human tubercle bacillus, Strain H-37 2,000 cultures	
	gm.	per cent.	gm.	per cent.
Phosphatide	100.5	2.25	253.1	6.54
Acetone-soluble fat ...	289.5	6.47	240.0	6.20
Chloroform-soluble wax...	444.8	9.98	427.0	11.03
Total lipoids	834.6	18.70	920.1	23.78
Polysaccharide	41.2	0.92	33.9	0.87
Dry bacillary residue ...	3389.8	80.38	2902.0	75.01
Dry bacterial matter per culture	1.488	—	1.928	—

L. R.

SANJURJO (D.) & SANJURJO (Marguerite). La réaction de Vernes chez quelques lépreux et quelques témoins. [**The Vernes Reaction in Lepers and Others.**—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 127-128.

The authors report finding serum flocculation in 24 out of 36 lepers and in only 35 per cent. of non-lepers' serums sent for tests, including syphilitics.

L. R.

LEGER (Marcel). Séroflocculation au péréthynol chez les lépreux. [**Sero-flocculation with Perethynol in Lepers.**—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 128-129.

The author refers to the above work and he points out that he had found that Vernes' sero-flocculation with perethynol gave a normal photometric index in non-syphilitic lepers, and resorcine gave negative results with non-tubercular lepers; contrary to the results of Margaret SANJURJO in Asuncion. He attributes these to the very high rate of syphilitic infections in Asuncion.

L. R.

AMBROGIO (Agostino). La reazione di Rubino nella lepra. [**The Rubino Test in Leprosy.**—*Pathologica.* 1932. Apr. 15. Vol. 24. No. 486. pp. 258-268. [19 refs.] English summary.

The authors conclude that the Rubino test has some value, but is not a sure test for the presence of leprosy.

L. R.

RAO (G. R.) & ROY (A. T.). 'Mercurochrome 220 Soluble' in Leprosy Work.—*Indian Med. Gaz.* 1932. Mar. Vol. 67. No. 3. pp. 124-128. With 2 charts in text.

The title of this paper is a misnomer as the 12 cases included 3 of sepsis, 3 *Bact. coli* infections and the rest arthritis, neuritis and vague pains in lepers. A certain amount of benefit was observed in some of the patients after the treatment with the mercurochrome.

L. R.

- DELAMARE (G.) & GAONA (R. Jimenez). Lèpre et acromégalie.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Mar. 7. 48th Year. 3rd Ser. No. 8. pp. 267-270.
- DELAMARE (G.) & GAONA (R. Jimenez). Lignes rouges et lignes blanches, réactions nulles des lépreux.—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 200-204.
- HOFFMANN (W. H.). O tratamento precoce da lepra.—*Distribuição da Sociedade de Assistencia aos Lazaros e Defesa contra a Lepra.* 1931. São Paulo. 9 pp.
- LAQUIÈZE (E.). Un cas de lèpre.—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 123-124.
- MARKIANOS (J.). Les verrues vulgaires des lépreux.—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 302-303.
- MORROW (Howard). Personal Experiences with Leprosy.—*Southern Med. Jl.* 1932. Feb. Vol. 25. No. 2. pp. 158-162. [18 refs.]
- MOTTAT (Joaquim). Les sarcoides de la lèpre.—*Ann. Dermat. et Syph.* 1931. Nov. 7th Ser. Vol. 2. No. 11. pp. 1180-1187. With 3 figs.
- TISSEUIL (J.). Contribution à l'étude des tuberculoïdes de la lèpre. Stade tuberculoïde inachevé.—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 898-902.
- TISSEUIL (J.). Observation d'un sujet réfractaire à la lèpre, mort de cancer.—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 124-127.
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RELAPSING FEVER AND OTHER SPIROCHAETOSSES. "

ATKEY (O. P. H.). La fièvre récurrente au Soudan en 1930. [**Relapsing Fever in the (Anglo-Egyptian) Sudan in 1930.**—*Bull. Office Internat. d'Hyg. Publique.* 1931. Nov. Vol. 23. No. 11. pp. 2000–2006.

Isolated cases of louse-transmitted relapsing fever occurred in the Blue Nile Province from April onwards, and during the last four months of the year in the irrigated region of Gezirah, 379 cases were recorded from among the immigrants from the west. The mortality was 11·9 per cent. compared with 60 to 80 per cent. in the Darfur epidemic four years previously. [The author suggests a diminution in the virulence of the disease, but the possibility of different social conditions, nutrition, etc., cannot be ignored.] A very striking difference was observed between this recent epidemic and the Darfur outbreak in the number of spirochaetes in the blood. In the Darfur epidemic the parasites were only found during the first or second day of the febrile attack, and even then were rare, whilst in this recent epidemic spirochaetes were easily found even among contacts showing no symptoms of infection. Particulars are given of the administrative measures taken to combat the spread of these epidemics. In addition to the main epidemic in the irrigated regions, cases also occurred in other parts of the Blue Nile, and in the provinces of Darfur, Kordofan, Khartoum and the White Nile. *E. Hindle.*

SYSSINE (A.). La fièvre récurrente dans l'Union des Républiques Soviétistes socialistes de 1925 à 1930. [**Relapsing Fever in U.S.S.R. from 1925–1930.**—*Bull. Office Internat. d'Hyg. Publique.* 1931. Nov. Vol. 23. No. 11. pp. 1998–1999.

The disease seems to have shown a steady diminution from a total of 19,701 cases in 1925 to only 1,656 in 1930. In addition to the louse-transmitted relapsing fever a few cases of the tick-transmitted variety have been recorded from Central Asia. *E. H.*

VARDEN (Arthur E.). **Relapsing Fever. Report of Case.**—*California & Western Med.* 1932. May. Vol. 36. No. 5. pp. 344–346.

A report of the clinical history and pathological examination of a case of relapsing fever in a 5½ year old child in Big Bear Valley, Southern California, who became ill shortly after arriving at the Valley from Tucson, Arizona. Spirochaetes were found in later relapses. *E. H.*

MATHIS (C.) & DURIEUX (C.). Identité, à Dakar, de *Spirochaeta duttoni* var. *crociduræ* et du spirochète infectant dans la nature *Ornithodoros erraticus*. [**The Identity at Dakar, of *S. duttoni* var. *crociduræ* and the Spirochaete found in Naturally Infected *O. erraticus*.**—*C. R. Acad. Sci.* 1932. Mar. 21. Vol. 194. No. 12. pp. 1107–1109.

The authors have compared a strain of relapsing fever obtained from *Ornithodoros erraticus* found naturally infected at Dakar, with two strains from human cases of the disease, and a strain obtained

from a naturally infected shrew-mouse. Cross-immunity experiments were made with these various strains which, although showing minor differences, confirmed the view that *O. erraticus* is the transmitting host of the human relapsing fever occurring at Dakar. E. H.

NICOLLE (Charles) & ANDERSON (Charles). Nouvelle preuve de la spécificité individuelle des spirochètes de la fièvre récurrente hispano-africaine. [New Proofs of the Individual Specificity of the Spirochaetes of Spanish-African Relapsing Fever.]—C. R. Acad. Sci. 1932. May 9. Vol. 194. No. 19. pp. 1618-1620.

The authors' views on this subject have been criticized by DELANOË on the grounds that too large doses of spirochaetes were used in their cross-immunity tests. Accordingly they have repeated cross-immunity experiments with each of four races of spirochaetes isolated from four cases of Spanish-African relapsing fever. With each race some of the animals were infected through the conjunctiva, and others subcutaneously. The results of cross-immunity tests, using different doses and methods of infection, show that the dosage is of no significance, and the races of spirochaetes isolated from different individuals showing the same type of disease, can all be distinguished from each other by cross-immunity tests, as well as by agglutination or lysis tests. E. H.

NICOLLE (Charles) & ANDERSON (Charles). Sensibilité du porc aux souches africaines de *Spirochaeta hispanicum*. [Susceptibility of the Pig to African Strains of *S. hispanica*.]—C. R. Acad. Sci. 1932. Jan. 25. Vol. 194. No. 4. pp. 333-335.

Three young pigs inoculated respectively with relapsing fever from three separate sources in North Africa, all became infected, as determined by subinoculations into other animals made after 32 days. None of the three showed any clinical symptoms of the infection, and spirochaetes were never found in the circulation. Although susceptible, the authors consider the infection in pigs too slight for this animal to be considered of importance as a natural reservoir of the virus. E. H.

DELANOË (P.). Contribution à l'étude du pouvoir pathogène du spirochète marocain, *Sp. hispanicum* var. *marocanum* Ch. Nicolle et Ch. Anderson 1928. [Pathogenicity of the Moroccan Spirochaete, *S. hispanica* var. *marocana*.]—Arch. Inst. Pasteur de Tunis. 1931. Dec. Vol. 20. No. 3. pp. 274-282.

Three foxes were infected, two by the inoculation of infected blood and the other by the bites of *Ornithodoros*. Weasels were also infected, the young being more susceptible than older animals. Similar results were observed in rabbits. Four newly-born kittens were also infected by the inoculation of blood containing spirochaetes. They all recovered and neither rabbits nor the kittens showed any residual infection of the central nervous system. E. H.

DELANOË (P.). Le réservoir de virus du spirochète marocain, *Sp. hispanicum* S. de Buen, var. *marocanum* Ch. Nicolle et Ch. Anderson 1928. [The Reservoir of the Virus of *S. hispanica* var. *marocana*.]—*Arch. Inst. Pasteur de Tunis*. 1931. Dec. Vol. 20. No. 3. pp. 286-314.

The author gives details of the examination of large numbers of wild animals in Morocco with the object of determining which species may serve as a reservoir for this spirochaete. In addition to various rodents, carnivores and insectivores have been shown capable of harbouring the virus; and it is evident that the infection is very widespread in nature and there is no likelihood of its being eradicated. Consequently, to reduce the chance of infection, simple hygienic measures are recommended, such as avoiding the neighbourhood of burrows or pig farms which may harbour infected *Ornithodoros*. Also when hunting, riding-boots should be worn as a protection against the bites of these ticks.

E. H.

NICOLLE (Charles), ANDERSON (Charles) & LAIGRET (Jean). Etude des spirochètes des trois premiers cas de fièvre récurrente hispano-africaine, rencontrés en Tunisie. [A Study of the Spirochaetes from the First Three Cases of the Spanish-African Relapsing Fever occurring in Tunis.]—*C. R. Acad. Sci*. 1931. Dec. 28. Vol. 193. No. 26. pp. 1370-1371.

The strains of *S. hispanica* isolated from these three cases Z, B and R, were studied for pathogenicity to various laboratory animals, cross immunity and methods of transmission. Recovery from infection with any of these three strains was followed by immunity only against the same virus, and not against spirochaetes belonging to different groups (*S. duttoni*, *S. normandi*), or the same group (*S. hispanica*), even though occurring in the same locality. The authors' results confirm their view that there are no distinct species of relapsing fever spirochaetes but only groups.

E. H.

ANDERSON (Charles). Complément à l'étude du pouvoir pathogène du virus de Sidi Salem. Sensibilité du renard et du chacal. [Pathogenicity of the Sidi Salem Virus. Susceptibility of the Fox and Jackal.]—*Arch. Inst. Pasteur de Tunis*. 1931. Dec. Vol. 20. No. 3. pp. 315-316.

This article is supplementary to the author's study of a strain of Spanish relapsing fever found in Tunis [see this *Bulletin*, Vol. 28, p. 731]. A young fox and a young jackal were inoculated with infected blood and although examined daily for a month neither showed any visible spirochaetes in the circulation; subinoculations into guineapigs made a week after the inoculation both resulted in these animals becoming infected.

E. H.

DELANOË (Paul). Au sujet des échecs de transmission du spirochète marocain par des ornithodores adultes (*O. erraticus* L.), non infectants d'emblée. [Failures in the Transmission of the Moroccan Spirochaete by Adult *O. erraticus*.]—*Arch. Inst. Pasteur de Tunis*. 1931. Dec. Vol. 20. No. 3. pp. 283-285.

The author gives two examples of unsuccessful attempts to infect adult *Ornithodoros* with the Moroccan strain of relapsing fever,

confirming NICOLLE and ANDERSON'S previous observations on this subject. Moreover, the larvae hatched from eggs laid by these ticks were also not infected. Yet it is well known that adult *Ornithodoros* caught in the burrows of wild rodents, are not infrequently infective. Up to the present there is no satisfactory explanation of this discrepancy.

E. H.

DURIEUX (C.). Cas de fièvre récurrente observés à Dakar et dans ses environs.—Decouverte de l'ornithodore agent de transmission de l'infection. [**Cases of Relapsing Fever observed in and near Dakar. Discovery of the Transmitting Agent Ornithodoros.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 13-18.

During several years many attempts have been made to find the tick responsible for the transmission of the local strain of *S. duttoni* but without success. The author has recently succeeded in finding large numbers of *Ornithodoros erraticus* var. *maroccanus* in the burrows of rats in a military camp at Ouakam, near Dakar, as well as a single specimen in Dakar itself. Both the ticks found at Ouakam as well as those from Gorée [see this *Bulletin*, Vol. 29, p. 206] were found to be naturally infected with spirochaetes, and in mice regularly produced infection 5 days after feeding on them. There seems no doubt that this tick is responsible for the cases of relapsing fever occurring in this district.

E. H.

FEYTE (R.). Le diagnostic de surprise de la fièvre récurrente à tiques. [**The Unexpected Diagnosis of Tick Relapsing Fever.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 368-372.

Details are given of six cases of relapsing fever in Dakar, probably caused by *Ornithodoros*, which has been found in the burrows of rats. All these cases were diagnosed by finding spirochaetes in blood films, and from the variety of symptoms the author concludes that it would have been impossible to make a clinical diagnosis of the infection. He is of the opinion that the disease is probably much more common in Dakar than the number of recorded cases would lead one to suppose, and that in all febrile conditions it is essential to examine blood films.

E. H.

LAIGRET (J.) & FRIED (E.). Un cas tunisien de fièvre récurrente hispano-africaine. [**A Case of Spanish African Relapsing Fever in Tunis.**]—*Tunisie Méd.* 1932. Feb. Vol. 26. No. 2. pp. 73-75.

The record of a typical case of the Spanish type of relapsing fever in a native who had always lived in Tunis, thus confirming the presence of this disease in North Africa, in regions where *Ornithodoros erraticus* is found.

E. H.

EBERSON (Frederick) & MOSSMAN (William G.). *Spirocheta hispanicum* (Variety *Maroccanum*). Application in Fever Therapy and Diseases of Central Nervous System.—*Proc. Soc. Experim. Biol. & Med.* 1931. Oct. Vol. 29. No. 1. pp. 108-111.

The title of this paper is somewhat misleading as it contains no description of any cases of its application in fever therapy, but is

concerned with methods of cultivation and the life cycle of the spirochaete.

The best growth was obtained in hormone broth containing brain mash, prepared as follows:—1,000 gm. of fresh beef (or sheep) brain were boiled with 1,000 cc. of veal infusion, pH 8.0. The material was passed through a fine meat grinder, 0.2 per cent. glucose added, then tubed and autoclaved at 15 pounds for 15 minutes. After 7 to 10 days incubation at 38°C. spirochaetes were found in great numbers. Transplants were usually made every 7 days. In addition the organisms were grown in media containing one part minced brain tissue, one part isotonic dextrose (5.4 per cent. dextrose in water), one part isotonic sodium citrate (3.8 per cent. sodium citrate in water) and one part of whole blood.

The spirochaetes were found to have a marked predilection for the brain tissue and also inoculated guineapigs showed heavy brain infections. Cultures were found to contain virulent spirochaetes after 2 months incubation at 38°C.

The authors state that their observations of hanging drop preparations lead them to believe that *S. hispanica* develops in accordance with a definite life cycle in the red blood corpuscle passing from a granular stage to that of the adult spirochaetal form. Further studies are said to be in progress, including cinematographic records of the entire life-cycle of this organism.

E. H.

MARCHOUX (E.) & CHORINE (V.). Culture de formes invisibles du spirochète des poules. [Cultivation of an Invisible Stage of the Fowl Spirochaete.]—*C. R. Acad. Sci.* 1932. Mar 7. Vol. 194. No. 10. pp 917-918.

The authors have shown previously that the blood of fowls bitten by *Argas persicus* containing the fowl spirochaete, may become infective before visible spirochaetes can be found in the blood [see this *Bulletin*, Vol. 27, p. 701]. All attempts to culture spirochaetes from this infective blood failed to show any visible signs of these organisms in spite of dark ground illumination and various staining methods. Recently, however, the authors inoculated the contents of some of these microscopically negative tubes into young chicks, which became infected showing spirochaetes in their blood. The ultra-microscopic stage of the fowl spirochaete does not pass through a Chamberland filter and seems to be present in the serum, as washed blood cells failed to produce either infection or immunity. There is said to be no doubt as to the cultivation of this ultra-microscopic stage, for the cultures of later passages were found to be more virulent than the earlier ones.

E. H.

KLEINE (F. K.) & KRAUSE (Magdalene). Zur Kritik angeblicher Entwicklungsformen von Rückfallfieber-spirochäten in der Zecke (*Ornithodoros moubata*). [The Question of Development Forms of Relapsing Fever Spirochaetes in the Tick (*O. moubata*).]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 190-191.

The authors fed 47 "clean" ticks on a mouse infected with *S. duttoni* and each day, for 33 successive days, killed and examined one of these ticks. Only in three ticks were spirochaetes not found, but in each case a second tick was examined and found to be positive.

In a second experiment ticks were fed on an infected mouse and from the 3rd to the 8th day after the meal, 6 ticks were killed on each day and their contents inoculated into mice. Only one out of 12 mice inoculated failed to become infected. The authors, therefore, obtained no evidence in support of the existence of any developmental stages in the tick analogous to the development of *Plasmodium* or *Trypanosoma* in the intermediate host, in which a negative phase occurs and the inoculation of the contents of this transmitting host into the vertebrate host fails to produce infection. E. H.

CONSTANTINESCO (N.). Culture cellulaire et virus récurrentiel (*Spirochaeta duttoni*, souche Brazzaville). [**The Tissue Culture of Relapsing Fever Spirochaetes.**—*C. R. Soc. Biol.* 1931. Vol. 108. No. 38. pp. 1116-1117.

The Brazzaville strain of *S. duttoni* was cultured in the presence of pieces of fowl embryo or of mouse brain and spleen, mixed with the plasma of either fowl, rabbit or monkey. The spirochaetes were found to diminish rapidly in number after being added to cultures, and also there was a corresponding diminution in the virulence of the cultures to mice. After 7 to 8 hours at 38°C. one out of six inoculated mice remained negative; after 15 hours, four out of eight; and on the third day all were negative.

It seems, therefore, that when this spirochaete is put in contact with cellular tissue and plasma, it rapidly loses its virulence, and according to the author does not complete the developmental cycle necessary for the production of the virulent stage of the organism. E. H.

LAGRANGE (E.). Etudes sur la phase nerveuse de la fièvre récurrente expérimentale à *Spirochaeta Duttoni*. [**Studies on the Nervous Phase of Experimental Infection with *S. duttoni*.**—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 804-809.

Using a strain of *S. duttoni* obtained from BRUMPT, the author found a residual brain infection in only one of eleven mice, although it was present in the majority of rats that had been similarly inoculated. The intracerebral method of inoculation was found to be the most certain method of producing residual brain infections, in spite of the fact that the rats inoculated by this route all showed very few parasites in the blood. Occasionally brain infections were observed in rats that had been inoculated intraperitoneally and had shown no apparent blood infection. In one instance a residual brain infection was observed in a rat 242 days after the original inoculation. Infection was followed by immunity of long duration, but all attempts to immunize experimentally were negative. When immunized animals are reinoculated there is either no appearance of spirochaetes in the blood, or they appear for a short period not exceeding 24 hours.

Although infected brains kept in glycerine at 37°C. lose their virulence within a day, in one instance the author produced infection by the inoculation of such material kept for 24 hours in the ice-chest. E. H.

BEUNDERS (Bart Johan Willem). Onderzoekingen over de persistentie van *Spirochaeta duttoni* in de hersenen van muizen bij experimentele febris recurrens. [**Persistence of *S. duttoni* in the Brains of Mice, Experimentally Infected.**] [Thesis for Doctorate in Medicine, Univ., Leiden.]—78 pp. With 6 figs. on 3 plates. 1932. Leiden: N.V. Leidsche Drukkerij, Morschinkel 14-15.

A large number of experiments have demonstrated the fact that the organisms of relapsing fever do persist in the brains of mice which have survived infection. The longest periods of such persistence were, in these experiments, 343, 373, 385 and 409 days, nor is there reason to believe that the limit has been reached. Success of this description is not attained with all strains but is given by the Hamburg (1906) spirochaete in nearly 100 per cent. of animals. The author is not in favour of the view, and in this he is in agreement with WENYON, that the spirochaete is to be found in the brain as an infective granule. It is, however, difficult to demonstrate its presence directly and this is explainable as due to the very small numbers present. His arguments against the existence of a granule phase are:—(1) The brains of animals that have survived lose their infectivity at exactly the same temperature as kills spirochaetes of circulating blood. (2) Spirochaetes may not be evident, if they are sparse, to microscopic examination of the tissue. He has, however, been able to infect mice with a single spirochaete. (3) He has succeeded in staining actual spirochaetes in the brains of mice after their recovery from infection by the method of Steiner.

It seems reasonable, therefore, to conclude that the spirochaetes persist in the brain wholly in the form of spirochaetes.

W. F. Harvey.

LEVADITI (C.), AUCLAIR (J.) & VAISMAN (A.). Influence de la pyrétothérapie (ondes courtes) sur l'évolution de l'infection récurrentielle du rat. [**The Effect of Pyretotherapy (Short Waves) on the Development of Relapsing Fever Infection in Rats.**]—*C. R. Soc. Biol.* 1932. Jan. 22. Vol. 109. No. 2. pp. 84-86.

The authors exposed rats and mice inoculated with *S. duttoni* to the action of hyperthermy for two periods of a few minutes each, without producing any obvious effect on the course of the infection. Moreover, 11 to 13 febrile attacks, in each of which the temperature rose about 4°C., produced by exposure to short waves, failed to destroy the invisible stage of the spirochaete in the central nervous system of infected rats. Approximately three months after the original infection, the brains of rats exposed to this treatment, and also those of controls, were found to contain the virus, and produced infection when inoculated into normal rats. All other organs were negative.

E. H.

KRITSCHESKI (I. L.) & DEMIDOWA (L. W.). Das Natriumthiosulfatphänomen. I. Die Verwandlung der salvarsanfesten Spirochäten zu salvarsanempfindlichen. [**The Sodium Thiosulphate Phenomenon. I. Conversion of Salvarsan-Resistant Races of Spirochaetes to Salvarsan Sensitive.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 73. No. 3/4. pp. 303-311.

The authors found that when salvarsan-resistant strains of spirochaetes (three strains of *S. duttoni*) were exposed to the action of

sodium thiosulphate they became susceptible to the action of the drug. Mice infected with the original resistant strains were inoculated intravenously with 0.05 cc. per gm. body weight of 2.5 per cent. sodium thiosulphate. These spirochaetes were then found to have lost their resistance to the action of salvarsan and after 17 to 18 passages in mice were still susceptible to the action of the drug, in contrast with the original strains which were still resistant.

The authors consider that the alteration in the resistance of the spirochaetes is possibly the result of new chemoreceptors being formed by the action of the thiosulphate. A table is given showing the very striking differences obtained in the treatment of mice infected with the original resistant strains, and others infected with the same strains after exposure to the action of sodium thiosulphate some time previously. All the latter, numbering 55 mice, were cured by injections of salvarsan, whilst with the same treatment only 3 out of 45 mice infected with the original strains were sterilized. E. H.

LEBEDEWA (M. N.) & GALANOWA (N. W.). Ueber die Sterilisierung des Zentralnervensystems durch chemotherapeutische Agentien. I. Die Rolle des Temperaturfaktors bei der Therapie des Rückfallfiebers durch Salvarsan. [*Sterilization of the Central Nervous System by Chemotherapeutic Agents. I. The Influence of Temperature on Salvarsan Therapy in Relapsing Fever.*—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 3/4. pp. 298-312. With 2 text figs. [12 refs.]

Mice infected with a Berlin strain of *S. duttoni* were treated with a Russian preparation of alkaline salvarsan, in doses of 0.0025 gm. per 20 gm. body weight. Some were treated in the early stages of the infection when there were not more than three spirochaetes to each field. Thirty of these mice were placed in a incubator at 40°C. for 2 hours before receiving the drug, and after treatment returned to the incubator for another 2 hours. Another 30 similarly infected mice were treated but kept at room temperature. Seventeen days later the brains of all the mice were inoculated into other animals in order to test for sterility, and 18 or 60 per cent. of the mice treated at room temperature were still infected, whereas all those that had been heated to 40°C. before and after treatment were found to have been completely sterilized. Another series of mice were treated at later stages of the disease after the brain had become infected and similar differences observed between the "heated" and non-heated mice. The heat itself, without salvarsan treatment, was found to have no appreciable effect on the brain infection. The effect of heating the mice seems to be to increase the amount of arsenic entering the brain, for the results of quantitative analyses showed that the brains of "heated" mice contained five to ten times as much arsenic as the brains of unheated mice that had received the same doses of salvarsan.

A histochemical analysis of the brains of the two kinds of mice, using Jancso's method, showed a distinct deposition of salvarsan in the brain vessels of the heated mice but none in the unheated controls. By means of other methods of analysis (nephelometric) the average amount of arsenic in the organs of five heated and five unheated was found to be as follows. The results are given in mgm. per 1 gm. organ:—

	Brain	Spleen	Liver
Unheated Mice	0.0126 mgm.	0.0263 mgm.	0.27 mgm.
Heated Mice	0.1 mgm.	0.014 mgm.	0.037 mgm.

Other experiments confirmed the view that the action of heating the mice was to lower the "haemato-encephalitic barrier." [This method seems to have been used in the treatment of human syphilis, as there are old records of patients being kept in hot baths whilst undergoing treatment.] E. H.

DUBOIS (A.). Traitement de l'infection de la souris par *Sp. duttoni* au moyen du solganal et solganal "B." [The Treatment of Mice Infected with *S. duttoni* by Means of Solganal or Solganal B.]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 281-292.

Mice and rats infected with various Congo strains of *S. duttoni* were inoculated with varying doses of Solganal, or Solganal B, in some instances combined with 914. The results show that residual brain infections are particularly susceptible to these gold compounds, but although the medicament is active and well tolerated, the results vary according to the species of animal used for the tests and above all according to the strain of spirochaete. The author is of the opinion that these gold compounds are worth trying in human cases, since many strains of spirochaetes are resistant to 914, and especially because solganal seems to have neurotropic affinities and would possibly prevent the development of meningitis or ocular symptoms. The curative mechanism is considered to be capable of explanation by EHRLICH's old theory. Early and effective treatment of the infection prevents the development of natural immunity, and consequently such treatment leaves the patient susceptible to reinfection.

E. H.

TODA (Tadao). Ueber die Wirkung der chemotherapeutischen Mittel (besonders Goldpräparate) auf die im Gehirn persistierenden Recurrensspirochäten und ueber die grundlegenden Untersuchungen von der Persistenz der Recurrensspirochäten im Gehirn. Experimentelle Beiträge zur Therapie der Spirochätosis. I. Mitteilung. [Experimental Studies on the Therapy of Spirochaetosis. Brain Infections. Part I.]—*Jl. Oriental Med.* 1931. Dec. Vol. 15. No. 6. [In Japanese. German summary pp. 132-133.]

Mice infected with *S. duttoni*, *S. crociduræ* [another strain of *duttoni*], and *S. hispanica*, were treated with sanocrysin, triphal, krysolgan, solganal, gold salvarsan and neosalvarsan, respectively. Complete sterilization, including the brain tissue, was obtained only by the use of solganal, and of the remaining five compounds neosalvarsan was the best.

A strain of Manchurian relapsing fever, isolated ten years previously, has been subsequently maintained by passage in mice and occasionally in man. The original strain did not persist in the brains of infected mice, but after being passaged for ten years, its virulence

has increased and it has acquired the habit of producing residual brain infections. No difference could be detected in the resistance of the two strains to treatment with neosalvarsan. *E. H.*

DICKINSON (Porter S.). Ueber die Wirkung des Salvarsans auf die Spirochäten im Gehirn von Recurrenstratten bei Benutzung verschiedener Recurrenstämme und Variation des Behandlungstermins. [**The Action of Salvarsan on Spirochaetes in the Rat's Brain.**—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Mar. 19. Vol. 113. No. 4. pp. 682-689. [21 refs.]

The author uses two strains of relapsing fever, both Hamburg strains of *S. duttoni* and *S. angola* respectively. The first of these was resistant to salvarsan and the latter susceptible. No difference could be detected between the two strains as regards the persistence of residual brain infections in infected rats treated in various ways. A single subcutaneous injection of 0.0246 gm. sodium salvarsan per 100 gm. rat, which is almost the toxic dose, was administered at intervals varying from 2 days to 8 or 9 weeks after the inoculation of spirochaetes. All the 16 rats treated in this manner showed residual brain infections when examined eight days later although in every case the blood was negative. Other series of infected rats were injected four times at two-day intervals, with half the above dose of salvarsan, the treatment also starting at various intervals after the inoculation of the spirochaetes. The first series was inoculated with *S. duttoni* and a second series with the Angola strain. In both series all the rats except two treated two days after being inoculated with the spirochaetes showed residual brain infections and the blood was negative. In the first two, however, the blood was positive and brains negative. *E. H.*

VAN DEN BERGHE (L.). Valeur comparative de divers procédés rapides de coloration pour la mise en évidence des tréponèmes et des leptospires dans les frottis. [**Staining of Spirochaetes in Films.**]—*Rev. Belge Sci. Méd.* 1931. Nov. Vol. 3. No. 9. pp. 994-999. [12 refs.]

After trying eight different staining methods recommended for spirochaetes, the author finds that all are inferior to dark ground examination, which is in every way the method of choice. The best method of staining was found to be Mühlpfordt's after fixation in Rüge or formol-alcohol as follows:—

Fix the film for 2 to 4 minutes in Rüge's formol acetic, or in absolute alcohol containing 10 per cent. formalin; allow to dry, and then stain for 2 to 3 minutes in a 3 per cent. aqueous solution of Victoria Blue 4 R (Grübler). Wash off the stain in water and allow to dry. The solution of the stain keeps indefinitely if kept in a brown bottle. *E. H.*

DELAMARE (G.) & GATTI (C.). Entérite algide spirochétienne. [**Spirochaetal Algid Enteritis.**]—*Bull. Acad. Méd.* 1932. May 17. 96th Year. 3rd Ser. Vol. 107. No. 107. pp. 657-659.

The clinical history of a fatal case in which enormous numbers of spirochaetes (*S. eurygyra* and *S. buccalis* types) were present in the intestine, associated with extreme enteric symptoms. *E. H.*

DELAMARE (G.) & GATTI (C.). Spirochètes et corps annulaires intra-leucocytaires. [*Spirochaetes and Intraleucocytic Annular Bodies.*]—*C. R. Acad. Sci.* 1932. May 23. Vol. 194. No. 21. pp. 1861–1862.

A description of the formation of rings or double rings from spirochaetes, in leucocytes from a case of Vincent's angina. [The appearances mentioned suggest the results of degeneration.] E. H.

BURKET (J. A.). Bronchial Spirochetosis, with Report of a Case.—*Med. Bull. Veterans' Administration.* 1932. Jan. Vol. 8. No. 1. pp. 26–37. [26 refs.]

KRITSCHESKI (L. L.) & SSINIUCHINA (M. N.). Les appareils de défense de l'organisme dans la fièvre récurrente.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 284–288.

LAQUIÈZE. Spirilloses intestinales en Nouvelle-Calédonie.—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.-Nov.-Dec. Vol. 29. No. 4. pp. 860–861.

NICOLLE (Charles) & ANDERSON (Charles). Sur le mécanisme de la transmission des spirochètes récurrents par les ornithodores.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 267–276.

RUSSELL (H. M.). Preliminary Observations on Relapsing Fever.—*Gold Coast Rep. of Laboratory Services Year 1929–1930.* Appendix A. pp. 19–28. With 4 figs. on 2 plates & 6 charts. [See this *Bulletin*, Vol. 28, p. 730.]

TROISIER (Jean). La spirochètose méningée ; son origine hydrique.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 254–255.

TROISIER (Jean) & BOQUIEN (Yves). Les porteurs de germes spirochètiques virulents chez le cobaye.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 291–292.

LEPTOSPIROSIS.

LÉPINE (P.), CAMINOPETROS (J.) & PAGONIS (A.). Sur un foyer de spirochétose ictéro-hémorragique dans l'île de Syra. Infectiosité comparée des rats de Syra, du Pirée et d'Athènes. [**A Centre of Spirochaetal Jaundice in Syra. The Comparative Infectivity of the Rats of Syra, Piraeus and Athens.**—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. pp. 613-614.]

PETZETAKIS (M.). L'épidémie de spirochétose ictéro-hémorragique de l'île de Syra. Sérodiagnostic et reproduction expérimentale. [**Spirochaetal Jaundice in Syra. Its Serodiagnosis and Experimental Transmission.**—*Ibid.* pp. 646-647.]

The sera of seven cases of infective jaundice occurring in Syra were sent to PETTIT and found to agglutinate *S. icterohaemorrhagiae*, although guineapigs inoculated with blood and urine from these patients remained unaffected. Subsequently six rats of the district were examined and all found to be infected, two of them producing fatal infections in guineapigs. 120 rats caught in Piraeus, and 13 in Athens, inoculated into 33 guineapigs, gave completely negative results. [This absence of infection is very surprising in view of the results of the examination of rats in other parts of the world.*]

E. Hindle.

LEGER (Marcel). Spirochétose ictéro-hémorragique à la Guadeloupe. [**Spirochaetal Jaundice in Guadeloupe.**—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 304-306.]

The clinical history of suspected cases of this disease in Guadeloupe. The diagnosis was confirmed by the use of a strain of *S. icterohaemorrhagiae* from the Pasteur Institute, Paris, which was agglutinated by the serum of two of the cases in dilutions of 1 : 1,000. When these same sera were mixed with a neurotropic strain of yellow fever virus and inoculated intracerebrally into mice, no protection was observed, thus excluding the possibility of these being undiagnosed cases of yellow fever.

E. H.

SMITS (E.). Ziekte van Weil op Tarakan (Borneo). [**Well's Disease in Tarakan (Borneo).**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Mar. 1. Vol. 72. No. 5. pp. 284-286.]

Smits, whose previous experience in Sumatra made him familiar with the clinical picture of leptospirosis, recognised 26 cases in two years in Tarakan, an island on the N.E. Coast of Borneo; 3 cases ended fatally. For diagnosis value is attached to the conjunctival injection.

As regards the epidemiology the author could not trace contact with polluted water as the source of the infection. River water is polluted with oil from the factory and not used for bathing purposes. Dogs and rats are present in abundance. The author lays stress upon the fact that Weil's disease is far more prevalent in men than in women and children; he asks how this can be explained if the infection is caused by polluted water only.

W. J. Bais.

* But see below PETZETAKIS, p. 568, four out of ninety-six rats were positive.

BROWN (E. Kempson) & CLEVELAND (Arthur J.). **A Case of Spirochaetosis Icterohaemorrhagica.**—*Brit. Med. Jl.* 1932. Feb. 13. pp. 283-284.

The record of a fatal case of this disease in a Norfolk farmer, the clinical diagnosis being confirmed by the discovery of spirochaetes in the kidney on postmortem examination. The patient was bitten by a ferret five days previous to being taken ill, and the ferret had been bitten in the mouth by a rat just before biting the farmer. Subsequently the ferret died. It is noted that most rat catchers state that any wounds from rats may be fatal to ferrets unless they are at once disinfected; a common practice is to urinate on the wound.

E. H.

HIRANO (H.). **Study on a Philippine Strain of *Leptospira icterohaemorrhagiae*.**—*Philippine Jl. Sci.* 1932. May. Vol. 48. No. 1. pp. 103-113. With 1 text fig.

A detailed experimental study of a strain of *S. icterohaemorrhagiae* isolated from the urine of a fatal case of infectious jaundice occurring in a long-time resident of Manila. Although typical symptoms were produced in guineapigs by passage inoculation, the virulence of this Manila strain in experimental animals (guineapigs and mice) was strikingly low compared with that of the Japanese strains studied. About half the animals recovered, and some of these became carriers, passing large numbers of leptospira in the urine. Animals sub-inoculated with these organisms showed febrile symptoms and in turn usually became carriers. The low virulence of the Manila strain is offered as a possible explanation of the rarity of Weil's disease in Manila among rats as well as men.

E. H.

ERBER (Berthe). Agglutination de spirochétidés par le sérum d'animaux. [**The Agglutination of Spirochaetes by Animal Sera.**]—*C. R. Soc. Biol.* 1932. Jan. 29. Vol. 109. No. 3. pp. 165-168.

The author, after numerous examinations, found that human serum never agglutinates *S. icterohaemorrhagiae*, except when there is a record of the patient having been infected with this spirochaete. On the other hand animal sera gave conflicting results. The reaction was always negative with the serum of sheep, rabbits [but see BROWN and DAVIS, this *Bulletin*, Vol. 25, p. 106], mice, guineapigs, white rats, hamsters and a grass snake. Wild rats invariably gave a positive agglutination in dilutions of from 1 : 50 to 1 : 2,000. Dogs gave positive results in about half the sera examined. All normal horse sera also gave positive reactions in dilutions varying from 1 : 50 to 1 : 500; in immunized horses the reaction was weaker. The sera of 9 *Macaca cynomolgus* comprised one positive and eight negative; 279 *Cynocephalus papio*, or *C. hamadryas*, gave 11.8 per cent. positive. A gorilla gave a reaction in a 1 : 2,000 dilution; 2 chimpanzees were negative, but a third positive. A strain of leptospira isolated from Tokio water was agglutinated by dilutions of 1 : 30 with guineapig serum; 1 : 50, with two horse sera; 1 : 100 with a rabbit serum; 1 : 200 with a wild rat serum. Six fresh horses gave positive agglutinations in dilutions respectively of 1 : 100 to 1 : 500. A gorilla and chimpanzee both gave negative results. With another water strain from Erlangen, and also

the Vincent strain from Paris water, similar but feebler agglutinations were obtained. The results will be discussed more fully in a later communication.

E. H.

SCHÜFFNER (W.). Versuch der Vereinfachung der Serodiagnostik bei Weilscher Krankheit. [**Attempts to simplify the Serodiagnosis of Weil's Disease.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 239–243. With 2 text figs.

The author describes a method of agglutination developed by one of his assistants, Dr. S. PROEHOEMAN. Richly grown cultures of the leptospira are mixed either with 0.5 per cent. phenol, or preferably with 1 to 2 per cent. formalin. After the cultures have been allowed to settle they are suspended in 10 per cent. glucose, a homogeneous suspension of the organisms being obtained which will persist for one to two months. This suspension gives very satisfactory results when used to test the agglutination properties of the serum of suspected cases of Weil's disease.

E. H.

POSTMUS (S.) & SCHULTSZ (Th. W.). Technische opmerkingen betreffende de bacteriologische en serologische diagnostiek der ziekte van Weil (Spirochaetosis icterohaemorrhagiae). [**Technique of the Bacteriological and Serological Diagnosis of Weil's Disease.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. Jan. 16. Vol. 76. No. 3. pp. 252–261. With 2 text figs. English summary.

The methods are (1) direct demonstration of leptospira in the blood of the patient, (2) blood culture, (3) culture from the urine and (4) agglutination-lysis tests.

In method (1) 10cc. blood (taken as soon as fever manifests itself) and 2 cc. 2 per cent. sodium citrate are centrifuged 5 min. at 1,500 revolutions to bring down the leucocytes and erythrocytes. The supernatant fluid is then centrifuged again for 5 min. at the same rate to bring down blood platelets. A final centrifugation for 30 min. at 3,000 revolutions gives a deposit which is examined for leptospira. Blood culture by the second method may be direct or after passage in the guineapig. Of all these methods the first gives, when positive, the earliest possible diagnosis and this enables serum therapy to be begun in good time.

W F. Harvey.

BESSEMANS (A.) & THIRY (U.). Sur les leptospires isolés en Flandre orientale.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 244–247.

BRULÉ (M.), LIÈVRE (J. A.) & TSATSARONIS. Deux cas de spirochétose ictérigène à type d'ictère catarrhal; anémie spirochétosique.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Apr. 25. 48th Year. 3rd Ser. No. 13. pp. 520–524.

CAMINOPETROS (T.). Sur l'existence de foyers de spirochétose ictéro-hémorragique murine à Athènes, à Syra et au Pirée. Identité des souches murines avec une souche humaine isolée à Athènes.—*C. R. Soc. Biol.* 1932. May 6. Vol. 109. No. 15. pp. 1316–1317.

PETZETAKIS (M.) & KYRIAZIDES (K.). Sur la présence de *Spirochaeta ictero-hemorrhagiae* chez les rats d'égout, à Athènes.—*C. R. Soc. Biol.* 1932. Apr. 15. Vol. 109. No. 12. pp. 1083–1084

- SCHÜFFNER (W.). Die weilsche Krankheit unter besonderer Berücksichtigung abweichender Fälle.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 248-252.
- TARASSOFF (Serge). La question des leptospiroses en U.R.S.S.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 252-253.
- UHLENHUTH (P.). Epidemiologie der Weilschen Krankheit mit besonderer Berücksichtigung der Wasserinfektion.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 225-243. French summary.
- ZUELLER (Margarete). Virulenzsteigerung von Wasserspirochaeten im Tierversuch.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 256-262. With 2 text figs.

RAT-BITE FEVER.

- SAISAWA (Kozo); TAISE (Kuniichi). On *Spirochaeta morsus muris* appearing in the Peritoneal Fluid of the Mouse. (First Report) [SAISAWA & TAISE].—*Japanese Jl. Experim. Med.* 1932. Feb. 20. Vol. 10. No. 1. pp. 1-19. With 3 figs. on 1 plate. (Second Report) [TAISE].—*Ibid.* pp. 21-25. (Third Report). On the Agglomeration Phenomenon of the *Spirochaeta morsus muris* [TAISE].—*Ibid.* pp. 27-28. With 4 figs. on 1 plate.

Mice inoculated in various ways with a strain of *S. morsus muris* [= *Spirillum minus*] were found to show large numbers of these organisms in the peritoneal fluid. They begin to appear in this fluid 4 to 5 days after inoculation and reach their maximum 5 to 6 days later, 10 to 50 or more being found in one field. They appear in the blood somewhat later and their numbers never exceeds 5 to 6 per field. Also the numbers of spirilla in the peritoneal fluid show no apparent decrease and continue indefinitely until the death of the animal, whereas the numbers in the blood gradually diminish. The concentration of the peritoneal fluid was found to affect the number of spirilla, the older mice with the higher concentrations showing larger numbers than younger mice with lower concentrations of the fluid. Consequently it is advisable to use mice weighing at least 20 gm. in order to obtain large numbers of the organisms. Splenectomy is stated to have caused an increase in the numbers if the infection was previously mild, but to have had no effect on heavy infections.

The second report contains details of further experiments on this problem. The number of spirilla appearing in the peritoneal fluid was found to be slightly larger in French mice than in German ones. [Paragraph 4 contains statements concerning mice weighing 80 to 90 gm. and is unintelligible.] Guinea pigs and rabbits inoculated with these organisms show mild infections in young animals, but very scanty infection in adults. Mice infected with *S. icterohaemorrhagiae* showed more of these organisms in the peritoneal fluid than in the blood, but mice infected with *S. duttoni* showed very many more parasites in the blood than in the peritoneal fluid. *S. pallida* did not appear in either blood or peritoneal fluid. The author considers the organism of rat-bite fever to be a true spirochaete of lymphatic nature which invades all parts of the body. When treated with neosalvarsan in quantities below the curative dose, the organisms persist in the brain and spleen whence they reinvade other parts of the body. The organism could not be found in the alimentary canal or in the urine, and attempts to

infect mice *per os* gave negative results. Mice (20 gm.) could be completely cured by the injection of 1/300 gm. neosalvarsan, or of silver-salvarsan, and 1/176 to 1/200 gm. of neo-silver-salvarsan.

In the third part, attention is called to the remarkable agglomerations of this organism, sometimes balls being formed containing 400-500 spirilla and measuring 40 to 50 μ in diameter. This phenomenon is usually found in young and adult mice showing vigorous life and it is commonest in peritoneal fluids of low concentration, being found in 5 to 10 per cent. of the infected animals. Under the dark field these clumps move like a rolling ball. The agglomeration may be produced artificially by splenectomy of an infected mouse, or by the intraperitoneal injection of the serum and organ extracts of various animals. The necessary conditions for this artificial production of the phenomenon are a large number of spirilla, a high concentration of the peritoneal fluid and injection into the peritoneum. When formed naturally, agglomerations generally appear about the tenth day of infection, and may persist for 2 or 3 days up to a month or more. When produced artificially, agglomeration starts about 15 minutes after the injection, reaches its maximum in about an hour, and disappears as the injected fluid is absorbed. The cause of this phenomenon is not known. E. Hindle.

VAZQUEZ-COLET (Ana). **Rat-Bite Fever in the Philippines.**—*Philippine Jt. Sci.* 1931. Oct. Vol. 46. No. 2. pp. 159-167. With 8 figs. on 3 plates.

An account of a case of typical rat-bite fever in a native child in Manila, in which the causative agent of the disease was demonstrated in tissue smears from the patient, and also recovered from mice and guineapigs inoculated with the infective material. This seems to be the first definite record of the existence of this disease in the Philippine Islands. E. H.

ANDERSON (Nelson Paul) & SPECTOR (Bertha Kaplan). **Rat-Bite Fever associated with Sporothrix.**—*Jl. Infect. Dis.* 1932. Apr. Vol. 50. No. 4. pp. 344-349. With 1 text fig. [20 refs.]

From a clinically typical case of rat-bite fever in the United States, the authors isolated a sporothrix-like organism which gave a strong complement fixation and agglutination with the patient's own serum and also with serum obtained from a case of the lymphangitic type of sporotrichosis. Blood and serum obtained from an incised gland were examined on two separate occasions but spiral organisms could not be detected and subinoculations into white rats gave negative results. On both occasions, however, a plentiful growth of sporothrix was obtained in cultures of both blood and serum. E. H.

ARAUJO (Eduardo). Diagnostic expérimental d'un cas de sodoku.—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1931. Nov. Vol. 2. No. 11. pp. 1125-1128.

SCHOCKAERT (Jos.). L'unicité des souches du "*Spirillum minus*," agent étiologique du sodoku.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 288-290.

STEFANI (F.). Un caso di sodoku: il primo segnalato in Polesine.—*Giorn. di Clin. Med.* 1930. Sept. 20. Vol. 11. No. 13. pp. 931-932.

YELLOW FEVER.

BERRY (G. P.) & KITCHEN (S. F.). **Yellow Fever accidentally Contracted in the Laboratory. A Study of Seven Cases.**—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 365-434. With 11 text figs. [58 refs.]

An exact record of clinical and laboratory observations on seven patients who contracted yellow fever in the Yellow Fever Laboratory of the Rockefeller Foundation in New York subsequent to March, 1929. In addition the authors give a table containing a useful summary of the total of 32 laboratory infections recorded up to date which, however, do not include the three additional cases described in detail by Low and FAIRLEY [see this *Bulletin*, Vol. 28, p. 290]. The clinical symptoms of these laboratory infections have varied between extremely mild, sometimes mistaken for a mild attack of influenza, and extremely severe resulting, in many cases, in death. In three instances infection was acquired from virus that had been passed through mice, and in two others the infection was the result of the bites of infected mosquitoes. In the remaining cases, however, there is no definite evidence of the method of infection, but it is assumed that contact with the blood or other tissues of infected monkeys resulted in the accidental infections, especially since the virus is known to be capable of penetrating the unbroken skin.

The seven patients whose cases are described in detail included infections ranging from very mild to moderately severe, and they all recovered; it is of interest that the only constant sign of the disease was the paradoxical pulse-temperature relationship, a falling pulse with a rising temperature. Bradycardia occurred independently of jaundice and additional evidence of myocardial injury was obtained by X-ray measurements of acute dilatation of the heart and by electrocardiograms. Convalescent human serum in amounts of 5 cc. given at bi-monthly intervals failed to prevent laboratory infections. The authors observed a guanidine increase in the blood of one of the mildly infected patients, thus confirming FINDLAY and HINDLE'S observations in monkeys [see this *Bulletin*, Vol. 28, p. 293]. A systematic study of the blood count showed an initial leucopenia due mainly to decrease in neutrophiles, reaching its lowest point about the 5th or 6th day. The monocyte count rose during convalescence. The diagnosis was confirmed by the successful transfer of the virus to monkeys and mice, and by the demonstration of protective antibodies. In one patient, virus was shown to exist in the blood 107 hours after the onset of fever, whilst antibodies were detected after 83 hours, thus confirming the simultaneous presence of virus and antibody in human blood in yellow fever.

E. Hindle.

CAZANOVE. A propos des récentes infections de laboratoire de fièvre jaune. [**Recent Laboratory Infections with Yellow Fever.**]—*Rev. Méd. et Hyg. Trop.* 1931. Nov.-Dec. Vol. 23. No. 6. pp. 293-294.

The author gives interesting extracts from BERENGER-FÉRAUD'S monograph which suggest cases of direct infection of yellow fever. A young pathologist in Paris received some "black vomit" from Rio de Janeiro in December, 1873, and as the temperature was cold thought there was no possibility of the material being infective. A few days

after starting the analysis of this material, however, he became infected and died with all the characteristic symptoms of yellow fever. Details are also given of four persons who about 1882 were present during the examination in Paris of infected blood and black vomit collected from a yellow fever patient in Senegal. All were subsequently affected in various ways and showed symptoms which might be explained on the assumption that they were mild cases of yellow fever. *E. H.*

SAWYER (W. A.), KITCHEN (S. F.) & LLOYD (Wray). **Vaccination of Humans against Yellow Fever with Immune Serum and Virus fixed for Mice.**—*Proc. Soc. Experim. Biol. & Med.* 1931 Oct. Vol. 29. No. 1. pp. 62-64.

The authors have found the most effective method of vaccination for immunizing human beings against yellow fever to be a simultaneous injection of yellow fever virus, attenuated by at least 100 passages through the brains of mice, and human immune serum. The virus suspension was prepared by making a 10 per cent. suspension of mouse brain tissue containing yellow fever virus in fresh, sterile, human, immune serum. The suspension was centrifuged, and the supernatant fluid passed through a Seitz or Berkefeld N filter. The filtrate was then tubed in 1 cc. portions and dried whilst frozen. The immune serum was obtained from patients recently recovered from yellow fever and was only considered suitable if 0.3 cc. per kilo bodyweight administered subcutaneously protected monkeys against a simultaneous injection of virus. 0.2 per cent. tricesol was added to the pooled serum. Ten persons were vaccinated, first receiving subcutaneous doses of the dried mouse virus which was dissolved in distilled water so as to restore the original volume. The amount of this fluid used was 0.03 cc. per kilo body weight and its inoculation was followed immediately by subcutaneous inoculations of the immune serum in two different places of the abdominal wall. The dose of this additional immune serum was 0.3 cc. per kilo body weight. None of the ten persons showed any symptoms of importance, yet they all developed protective power against yellow fever virus as tested by protection tests in mice and also (in 7 cases) in monkeys. Attempts to recover virus from the circulating blood 24 hours after vaccination were made in three cases but were unsuccessful. *E. H.*

SELLARDS (A. W.) & LAIGRET (J.). **Vaccination de l'homme contre la fièvre jaune.** [**Vaccination of Man against Yellow Fever.**]—*C. R. Acad. Sci.* 1932. May 2. Vol. 194. No. 18. pp. 1609-1611.

The authors inoculated five patients with emulsions of the brains of mice infected with yellow fever after 134 passages in mice. The infected brains were emulsified in sterile physiological saline solution containing 10 per cent. rabbit serum, 4.5 cc. being used for each mouse brain. This emulsion, corresponding to a dilution of 1 in 10, was centrifuged for three or four minutes and the supernatant fluid used for further dilutions. One drop of a dilution of 1 : 100,000 was found to be invariably fatal to mice inoculated intracerebrally. 1 cc. of a dilution of 1 : 10,000 or even of 1 : 1,000 inoculated subcutaneously into human subjects was found to produce no reaction but was followed by the development of protective antibodies in the blood. The inoculation of 1 cc. of a dilution 1 : 100 was followed by a slight rise in

temperature on the sixth and seventh days, accompanied with bradycardia and traces of albumen in the urine. These symptoms were only found by careful examination, the patient himself not being conscious of any malaise. After an inoculation of 1 : 10,000 or 1 : 1,000 dilution, increasing doses may be given without producing any ill effects, in one case the equivalent of half a mouse brain being inoculated. Immune bodies appear in the blood from the 7th to the 34th day after vaccination and probably persist for long periods. The authors recommend the use of this method for the protection of the population in regions where yellow fever is prevalent. Attempts to vaccinate patients with a mouse virus killed by chloroform, gave uniformly negative results.

E. H.

ARAGÃO (H. de Beaurepaire). Vaccination par le sérum et le virus dans la fièvre jaune. [**Vaccination with Serum and Virus in Yellow Fever.**]—*C. R. Soc. Biol.* 1931. Dec. 18. Vol. 108. No. 37. pp. 1078–1080.

The author gives examples of five monkeys inoculated with immune or hyperimmune serum, and 24 hours later with a dose of yellow fever virus. None of these animals showed any signs of infection and the reinoculation of virus after intervals ranging up to six months from the first dose also failed to show any signs of loss of immunity against the virus. This method is considered to be a simple and effective means of protection against yellow fever [see FINDLAY and HINDLE, *ante*, p. 201].

E. H.

MILLOUS, RABOISSON & PLUCHON. Observations cliniques sur un cas isolé de fièvre jaune traité par le sérum de Pettit. [**Clinical Observations on a Case of Yellow Fever treated by Pettit's Serum.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 362–366.

A yellow fever patient in West Africa received injections of Macaca anti-yellow fever serum prepared by PETTIT; 10 cc. were given on the 7th day of the disease and 20 cc. on each of the two following days. Before the nature of the disease was established the patient had received injections of anti-pneumonic horse serum, and large doses of calcium chloride. This patient recovered, but another patient in Togoland treated with large doses of anti-yellow fever serum succumbed to the disease.

E. H.

HINDLE (E.). **An Attempt to demonstrate Residual Virus in Monkeys which had recovered from Yellow Fever.**—*Brit. Jl. Experim. Path.* 1932. Apr. Vol. 13. No. 2. pp. 135–140.

The persistence of a high degree of immunity following an attack of yellow fever led the author to make experiments with rhesus monkeys that had recovered from the disease, in order to determine whether this persistent immunity was linked up with a residual infection, or carrier condition. Yellow fever virus and immune bodies are known to coexist in the blood during the febrile attack [see this *Bulletin*, Vol. 28, p. 285 and *ante*, p. 201]; therefore it is not impossible that virus might persist in the body of an animal showing a high degree of immunity. Accordingly monkeys were inoculated with suspensions of the tissues (brain, liver, kidney, and spleen) of animals recovered from yellow

fever. These tissues had been carefully washed to remove all traces of blood containing immune bodies, in order to permit the development of any virus that might have been masked by their presence. None of the inoculated monkeys showed any signs of infection, but those inoculated with liver and spleen developed a transient immunity, the duration being that produced by the inoculation of immune serum alone and probably passive in nature. The inoculation of kidney and brain tissue failed to produce even a transient immunity, but the inoculation of washed leucocytes (one experiment) from an immune animal conferred protection.

The inoculation of an over-neutralized mixture of yellow fever virus and antiserum was found to evoke an active immunity of long duration ; therefore, had any residual virus been present in the tissues of the recovered animals, its inoculation, even combined with immune bodies in the tissue, should have produced some effect. Since the immunity following the inoculation of liver and spleen had only the duration of the passive immunity conferred by the inoculation of immune serum, these findings suggest that yellow fever virus does not persist in the tissues of recovered monkeys.

In another series of experiments mosquitoes (*Aedes aegypti*) fed on mixtures of virus and immune serum failed to become infective ; consequently, this method is of no use for demonstrating the possible presence of virus in the tissues of recovered animals. Mosquitoes fed artificially on suspensions of virus readily became infected but the addition of immune serum to such suspensions prevented the development of infection within the insect.

E. H.

BAUER (Johannes H.). **The Duration of Passive Immunity in Yellow Fever.**—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 451–457.

The author's results indicate that the passive immunity to yellow fever conveyed to monkeys by the immune serum of an homologous species is of considerably longer duration than that conferred by the immune serum of a foreign species. 2.0 cc. of the pooled monkey immune serum used in these experiments gave complete protection in monkeys. This protection lasted for at least three weeks, but at the end of seven weeks had completely disappeared. In another series of experiments the monkeys were given 5.0 cc. of human immune serum. These were found to be immune when virus was given 7 days later, but before the end of 14 days the immunity had completely disappeared.

E. H.

SAWYER (W. A.). **The Persistence of Yellow Fever Immunity.**—*Jl. Preventive Med.* 1931. Nov. Vol. 5. No. 6. pp. 413–428. [10 refs.]

A record of the results of protection tests in monkeys with the sera of 60 persons who had had what was believed to be yellow fever between 30 and 78 years before the specimens of serum were obtained. The sera of 45, generally in doses of 3 cc., were proved to be protective, including five out of six sera from persons infected 75 years previously, and one 78 years. Immunity from yellow fever ordinarily seems to last for life and can be demonstrated by protection tests in either rhesus monkeys or white mice ; moreover, this immunity is not dependent

on any subsequent exposure to infection. Although there is evidence suggesting that in some cases the concentration of antibodies in the serum may gradually diminish until they are no longer demonstrable by protection tests with ordinary amounts of serum, it does not follow that such persons become capable of being re-infected. The evidence suggests that in many of the cases in which the serum does not protect monkeys there has been an error in the original diagnosis of yellow fever. *E. H.*

SELLARDS (Andrew Watson). **Technical Precautions employed in maintaining the Virus of Yellow Fever in Monkeys and Mosquitoes.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 79-92. With 5 text figs.

Details are given of the author's methods which have been used for the maintenance of a virulent strain of yellow fever in monkeys and mosquitoes over a period of three and one-half years, during which no laboratory infections have been acquired from either monkeys or mosquitoes. The drying of frozen virus is discouraged as it is considered to be dangerous to handle, and the author prefers the use of infected blood kept frozen at about -8°C . It is stated to maintain its virulence for many months under these conditions. *E. H.*

MATHIS (Maurice), MARTIN-CHARPENEL (G.) & KOLOCHINE (G.). **Adaptation du virus amaril à la souris blanche. [The Adaptation of Yellow Fever Virus to White Mice.]**—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 113-117.

Experiments were made with a mouse virus strain obtained from THEILER, at the 124th passage in mice when received, and a strain from monkeys recently inoculated into mice by the authors. After the third passage in mice this latter strain resembled Theiler's strain in its general effects. A series of protection tests were made with these two strains, using mixtures of a suspension of virulent mouse brain with normal rabbit serum, anti-yellow fever horse serum, or monkey immune serum, respectively. The mixtures were allowed to stand for 30 minutes and then inoculated intracerebrally into mice. Both strains of virus were found to be neutralized by the horse anti-yellow fever serum and the monkey immune serum. *E. H.*

RUSSELL (F. F.). **The Study of Yellow Fever by a Protection Test in Mice.**—*Amer. Jl. Med. Sci.* 1932. Jan. Vol. 183. No. 1. pp. 87-90.

The impression that yellow fever has almost disappeared from the world has been shown to be too optimistic for, as the author points out, the disease still persists in South America and is widely prevalent in West Africa. In the endemic areas the cases are few and apparently sporadic, but when the virus is carried outside these areas it may give rise to true epidemics. It is now generally accepted that an attack is followed by a permanent immunity, and by the use of protection tests in mice or monkeys it is possible to detect this immunity. Consequently the boundaries of endemic areas can be delimited by examining the blood serum of children, preferably using mice for the protection test. The presence or absence of yellow fever within the lifetime of each child can thus be determined. *E. H.*

GOODPASTURE (Ernest W.). **Yellow-Fever Encephalitis of the Monkey (*Macacus rhesus*).**—*Amer. Jl. Path.* 1932. Mar. Vol. 8. No. 2. pp. 137–150. With 11 figs. on 3 plates.

A study of the pathological changes in monkeys and mice infected with yellow fever, based on material supplied by SELLARDS. Monkeys inoculated intra-cerebrally with a mouse strain of the virus showed an acute disseminated encephalomyelitis, apparently extending throughout the central nervous system, affecting the cellular tissues and causing necrosis of both sensory and motor ganglion cells. Intranuclear inclusions sometimes resembling, but more often different from, those characteristic of the disease, were found with difficulty in the ganglion cells of five out of the nine monkeys examined. Cytologically, these inclusions are inconclusive evidence of the nature of the disease; on immunological and histological grounds, however, it is considered that the virus of mouse and monkey encephalitis represents a biologically modified strain of yellow fever virus.

E. H.

PETTIT (A.) & AGUESSY (C. D.). Le chimpanzé est-il réceptif au virus amaril. [**Is the Chimpanzee Susceptible to Yellow Fever?**].—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 190–191

A chimpanzee was inoculated intraperitoneally with 5 cc. of a mixture of blood and liver from a typical case of yellow fever in a *Macaca rhesus*, and at the same time two rhesus monkeys were inoculated as controls. Both the latter died of yellow fever but the chimpanzee showed no signs of infection. Nevertheless its serum acquired protective properties against the disease, in this respect resembling other refractory monkeys which have been used for the preparation of anti-yellow fever serum.

E. H.

HUDSON (N. Paul). **Dried Infectious Monkey Serum as Antigen in Yellow Fever Complement Fixation.**—*Amer. Jl. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 557–565.

The desirability of a simple test for the presence of immunity in monkeys that had been vaccinated in various ways, led the author to make further experiments with the complement-fixation reaction. The most effective antigen was found to be pooled monkey serum collected during the febrile period of acute attacks of yellow fever. If dried, in a frozen state, such serum maintained its properties for more than a year. Although not highly sensitive, this was found to be a more satisfactory antigen than infectious monkey liver, which occasionally gave false positive tests. Using antigen dilutions of 1:20 to 1:1,000 against a constant serum dilution of 1:5 and over-night fixation at about 5°C., the serum of four out of seven human convalescents gave a positive reaction. The sera of recovered monkeys usually gave positive fixation tests (12 positive, one negative and 3 anticomplementary); but monkeys surviving vaccination by various methods, including vaccine followed by virus, or immune serum and virus, nearly always gave negative reactions. Out of 55 monkeys that were tested one was positive, two weakly positive, 45 negative and 7 anticomplementary. It is concluded, therefore, that this method is not an effective means of determining the establishment of immunity in vaccinated monkeys.

E. H.

FROBISHER (Martin), Jr. **Precipitin Experiments with Yellow Fever Virus.**—*Amer. J. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 485–497. [15 refs.]

Rabbits repeatedly inoculated with large numbers of mosquitoes containing yellow fever virus, failed to develop any precipitins or protective bodies against the same virus in monkey blood. Also the injection into rabbits of large amounts of the virus from the blood of infected monkeys failed to produce any demonstrable precipitins against the virus in mosquitoes, although the injection of relatively very tiny amounts (0.02 cc.) of monkey-blood virus produced protective bodies against the same blood virus. It seems possible, therefore, that the virus in the mosquito may differ from the blood virus. The blood meal of the *Aedes aegypti* used in these experiments was found to average about 2.43 mgm. Using an anti-monkey serum capable of showing a precipitin reaction with a 1:20,000 dilution of monkey serum, it was not possible to detect monkey protein in these mosquitoes later than the fourth day after their blood meal. E. H.

HAAGEN (E.) & THEILER (M.). **Studies of Yellow Fever Virus in Tissue Culture.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Jan. Vol. 29. No. 4. pp. 435–436.

The authors have cultivated a strain of yellow fever pathogenic for mice, by using a medium consisting of minced chicken embryos 8 to 10 days old, suspended in a mixture of normal monkey serum and Tyrode solution, contained in Carrel dishes, and incubating at 37.5°C. The virus for the primary culture was prepared by grinding up infectious mouse brain with 9 times its weight of Tyrode solution and centrifuging the suspension for 10 minutes at 3,000 r.p.m. One part of the supernatant fluid was added to 4 parts of the culture medium and the mixture distributed in several Carrel dishes, about 2.0 cc. in each. Thus the final dilution of the virus was 1:50 that of the brain tissue. The cultures and subcultures were always tested for bacteriological sterility but no visible organisms were ever detected. Subcultures were made every three or four days using 0.5 cc. of the supernatant fluid of the culture to 2.0 cc. of fresh medium, each subculture thus resulting in a 1:5 dilution of the original virus content. It is estimated that at the 20th subculture the virus had been diluted about 5 million billion (5×10^{15}) times and yet the latest subcultures (22nd) were just as infectious as the original material. It is evident, therefore, that the virus multiplies in this medium. It appears that the virus of yellow fever like other filterable viruses needs living cells for growth *in vitro*. It is extremely labile and is changed or destroyed by minute changes in the culture medium. With the above described method, however, it is possible to grow yellow fever virus indefinitely by a method which has been used successfully for the cultivation of other filterable viruses.

E. H.

GÉRARD (P.), MOISSONNIER & WELTI. **Métabolisme des lipoides dans la fièvre jaune expérimentale.** [**Lipoid Metabolism in Experimental Yellow Fever.**]—*Bull. Acad. Méd.* 1932. Mar. 15. 96th Year. 3rd Ser. Vol. 107. No. 11. pp. 395–399.

As a result of the examination of more than 500 samples of tissues of monkeys dying of yellow fever, the authors come to the following

conclusions. There is a lowering in the amount of lipoid phosphorus and in the lipocytic coefficient ; an increase in the ratio of fatty acids to total lipoids ; and a marked diminution of unsaponifiable fats in certain organs, especially the supra-renals, kidneys and heart, which is not explained by the lowering of the cholesterol content. In spite of these changes the so-called "constant element," consisting of phosphatic fatty acids, does not alter. E. H.

KUCZYNSKI (Max H.). Magenveränderungen durch eine Sekundärinfektion mit *B. enteritidis* Gärtner bei gelbfieberinfizierten Meer-schweinchen. [**Stomach Changes produced in Guineapigs infected with Yellow Fever, by Secondary Infection with *Bact. enteritidis*.**]—*Virchows Arch. f. Path. Anat.* 1931. Aug. 17. Vol. 281. No. 2. pp. 422–429. With 8 text figs.

The author has previously described the presence of acute haemorrhagic ulcerations in the stomachs of animals infected with yellow fever [see this *Bulletin*, Vol. 27, p. 478]. Some of these animals also showed peritonitis and the exudate has been found frequently to contain *Bact. enteritidis* Gärtner, sometimes mixed with other organisms. It was found that yellow fever in guineapigs favoured the development of these secondary infections and in such cases extensive necrotic changes occurred in the stomach wall, which were quite distinct from those produced by yellow fever, but resembled in some respects the lesions that have occasionally been described in human cases of paratyphoid. The histological changes occurring in the stomach are well illustrated by photographs. E. H.

SCHÜFFNER (W.). Entwicklung und heutiger Stand der Gelbfiebersforschung. [**The History and Present Position of Yellow Fever Investigation.**]—*Klin. Woch.* 1932. Apr. 30. Vol. 11. No. 18. pp. 753–757. With 7 text figs.

A general review of certain aspects of yellow fever investigations. The main interest of the article is contained in the observation, made by POSTMUS, that the yellow fever strain at Amsterdam, after 50 passages in the brains of mice, had lost its virulence to monkeys (as observed by others) ; nevertheless, *Aedes aegypti* fed on an emulsion of infected mouse brain at the 50th passage, and after the necessary interval subsequently fed on a monkey, produced a fatal attack of yellow fever, the full virulence of the virus being restored by passage through the insect host. E. H.

BYRNE (J.). **A Case of Unclassified Fever at Nsawan, Gold Coast, during the Epidemic of Yellow Fever in 1926.**—*West African Med. Jl.* 1931. July. Vol. 5. No. 1. p. 13.

This case was observed in 1926 ; a mild case of fever without jaundice but the patient felt ill and depressed. The suggestion was made that the case might be one of mild yellow fever but in the absence of all classical signs this diagnosis was not accepted.

In April 1929 the serum of the patient was sent to the Rockefeller laboratories at Lagos for a protection test ; this was found to be strongly positive, showing that the patient had actually suffered from yellow fever. D. Harvey.

SAWYER (Wilbur A.). **Recent Progress in Yellow Fever Research.**—*Medicine*. 1931. Dec. Vol. 10. No. 4. pp. 509–536. [32 refs.]

A summary of recent publications with special reference to the work of the members of the International Health Division of the Rockefeller Foundation. E. H.

SAWYER (W. A.). **The History of Yellow Fever since the New Orleans Epidemic of 1905.**—*Southern Med. J.* 1932. Mar. Vol. 25. No. 3. pp. 291–296. [40 refs.]

A general historical account with special reference to recent investigations. E. H.

HOFFMANN (W. H.). Gelbfieber und Gelbfieberforschung. [**Yellow Fever and Yellow Fever Investigations.**]—Reprinted from *Ergebnisse d. Gesamt. Med.* 1931. Vol. 17. No. 1/2. pp. 113–170. With 4 text figs.

A good general account of the subject.

E. H.

RHO (Filippo). **Nephritis, Nephrosis, and the Characteristic Hepato-Nephrosis of Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1932. Jan. 15. Vol. 35. No. 2. pp. 17–20.

A general account of the subject, containing nothing original. E. H.

HINDLE (Edward). Démonstration de méthodes de manipulation de moustiques et expériences de transmission de la fièvre jaune.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. p. 473.

HINDLE (Edward). Démonstration d'une méthode de préparation du vaccin anti-amaril sec.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. p. 474.

HOFFMANN (W. H.). Las inclusiones intranucleares en la fiebre amarilla.—Reprinted from *Rev. Med. y Cirug. Habana.* 1931. Vol. 36. No. 11. pp. 795–807.

PETTIT (A.) & STEFANOPOULO (G. J.). 'Démonstrations histologiques relatives à la fièvre jaune chez le macaque du Nord-Africain (*Macacus inuus* L.).—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 474–475.

SAWYER (W. A.) & FROBISHER (Martin), Jr. The Reactions of Various Animals to Yellow Fever Virus.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 476–482.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

BACH (F. W.). Untersuchungen ueber die Verbreitung parasitischer Darmprotozoen des Menschen, insbesondere *Entamoeba histolytica*, in Nordwestdeutschland. [**Distribution of *E. histolytica* and Other Intestinal Protozoa in N. W. Germany.**].—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Jan. 16. Vol. 113. No. 2 & 3. pp. 321–344. [50 refs.]

Examination for parasitic intestinal protozoa of 1,000 subjects, none of whom had any intestinal troubles, in Northwest Germany, revealed 34 per cent. infected with intestinal protozoa: *Entamoeba coli* 21·7 per cent.; *E. histolytica* 5·7 per cent.; *E. hartmanni* 1·7 per cent.; *Endolimax nana* 5·6 per cent.; *Iodamoeba bütschlii* 3·1 per cent.; *Lambliia intestinalis* 5·5 per cent.; *Chilomastix mesnili* 0·4 per cent.

H. M. Hanschell.

SIMIĆ (Tshedomir). Etude expérimentale complémentaire de l'*Entamoeba dispar* Brumpt, de Skoplje, sur le chat. [**Experimental Study of *E. dispar* in the Cat.**].—*Ann. Parasit. Humaine et Comparée.* 1931. Nov. 1. Vol. 9. No. 6. pp. 497–502.

The author gives details of his further experimental studies on the non-pathogenic *Entamoeba dispar* found by him in Skoplje [*ante*, p. 250]. The strain of *E. dispar*, with which he had infected six persons, proved infective in seven young cats, of which five were successively infected one from the other. Although this amoeba maintained its existence 41 days in the cat, with five successful subinoculations in the cat, its epidemiological character remained unaltered. The amoeba though infecting the cat provoked in that animal no macroscopical lesions, even when the cat's rectum contained numerous amoebae; these amoebae were non-haematophagous. The author claims that since this *Entamoeba dispar* found in Skoplje presents biological characters identical with those described by BRUMPT for his *E. dispar* of Paris, there is no question here of a local race of amoeba but plainly a definite species, non-pathogenic for man, whose existence ought now to be admitted in all European countries.

H. M. H.

LEAKE (Chauncey D.). **Chemotherapy of Amebiasis.**—*Jl. Amer. Med. Assoc.* 1932. Jan. 16. Vol. 98. No. 3. pp. 195–198. With 1 text fig. [27 refs.]

An interesting and detailed critical review. Amoebiasis is a protozoan infection in which a variety of unrelated chemicals have some effectiveness, difficult to estimate quantitatively by laboratory experiment. To determine the use of different groups of such agents for the different phases of the disease is a clinical problem. Laboratory studies, such as here reviewed, may aid in pointing out the groups of drugs that give most promise of general usefulness and in determining which individual compound of a related series approaches most closely a definable ideal. Quantitative experimental methods in this field are hard to standardize, but, in agreement with DOBELL, effectiveness in monkey amoebiasis may be said to be the best laboratory criterion, if taken in conjunction with quantitative toxicity and pathological studies. The evidence

here presented indicates little hope of finding an ideal agent among the kurchi or ipecac. alkaloids, since the former seem too ineffective and the latter too dangerous in effective doses. Insufficient data are at hand to evaluate properly the place of alkyl resorcinols in the therapy of amoebiasis, but they deserve full investigation and the clinical success of bismuth salts also merits attention. Even hurried experimental survey of the halogenated oxyquinolines indicates that at least one other compound in this group, iodochloroxyquinoline, or vioform, N.N.R., is likely to prove much better in amoebiasis than sodium-iod oxyquinoline sulphonate, or chiniofon, N.N.R. Indeed vioform is the most efficient so far tried in monkey amoebiasis and in its therapeutic range it is apparently non-toxic.

Among the arsenicals experiment already reveals compounds better than the only one, acetarsone, so far given clinical consideration. Controlled clinical trial of 4-carbamino-phenyl-arsonic acid (carbarsone) based on preliminary experimental data, indicates its superiority to any amoebicide in ordinary use, especially in its marked effectiveness in non-toxic doses. In comparison with other chemical types of amoebicides, the organic arsenicals are significant in manifesting a general tonic effect, difficult to evaluate experimentally but clearly evidenced clinically; but they may exhibit toxic effects which make it expedient to employ them cautiously.

H. M. H.

MANSON-BAHR (P.). **Modern Methods of Treatment of Intestinal Amoebiasis.**—*Proc. Roy. Soc. Med.* 1931. Sept. Vol. 24. No. 11. pp. 1538–1545 (Sect. of Trop. Dis. & Parasit. pp. 46–53).

The author notes the difficulty of making sure that a case of intestinal amoebiasis has been cured. Natural cure occurs, and he has observed relapse after a seven years' interval of apparent cure. The comparative worth of different methods of treatment is therefore hard to assess. In this paper he has made a valuable contribution to knowledge and practice, for the conclusions set out are based on recorded observations during the last eleven years on 329 cases of intestinal amoebiasis—all Europeans whose subsequent careers could be traced; he has excluded his non-European cases on whom follow-up observations were not possible. These 329 cases comprised all clinical forms of the disease, and diagnosis and treatment in each case were established and checked by approved and tested methods of clinical, microscopical, and sigmoidoscopic research. *E. histolytica* was demonstrated in each case.

The cases come into three therapeutical period-groups: viz. 1920–24, emetine bismuth iodide treatment, 127 cases; 1925, inauguration of yatren treatment 21 cases; and 1926–31, combined E.B.I. and yatren treatment, 181 cases. While these observations then lack that perfection of control given only by the strict alternate treatment, with rigid non-selection of cases as they come, yet this paper clearly shows that the control observations provided by the long successive periods of different treatment, with the large number of patients in each period, have in fact presented evidence of significant value to determine the better treatment, which is shown to be the combined E.B.I. and yatren. Indeed after 1925 with the minor but accumulative discomforts and physical penalties of the original E.B.I. treatment obviously beneficially alleviated and averted by the addition of yatren and a more liberal and sustaining diet, the strict alternate treatment of human

patients could hardly have been pursued for long. The author declares the E.B.I. treatment (DALE and Carmichael Low 1916) a great advance on anything that had gone before, but one trying to patients and not least so on account of the strict milk diet enforced. Some could not tolerate the drug in therapeutic dose (grains 3) at all; some developed toxic symptoms; and some, who had had emetine injections before the E.B.I. course, "neuritis." The E.B.I. patients became mentally depressed and lost weight and an average of 20 mm. Hg. systolic blood pressure. He had had ten cases of acute clinical relapse with demonstration of the entamoeba in the stools within 6 weeks of cessation of E.B.I. treatment. Three cases had relapsed after 9 separate courses of E.B.I. 30 grains each—probably the parasite had become emetine-fast. Three E.B.I. cases had subsequently been readmitted to hospital with hepatic abscess.

In 1921 MÜHLENS and MENK introduced yatren for treatment of amoebic dysentery. The author's sigmoidoscopic observations forced on him the conclusion that greatest extent of amoebic ulceration was present in sigmoid colon and rectum, especially in the last two inches, and that emetine released from decomposition of E.B.I. did not act on lesions in sigmoid and rectum, but did act on lesions in caecum and ascending colon; furthermore yatren enemata did heal the lesions in rectum and sigmoid. He then decided on a trial of the combined E.B.I. and yatren treatment. This consists of the "routine" E.B.I. at nights, altered for those, especially women, who cannot tolerate E.B.I., to emetine periodide; and in the morning after preliminary cleansing of bowel by sodii bicarb. enema, 8 oz. of 2½ per cent. solution of yatren is slowly and gently run into rectum, and is retained as long as possible by the patient. A light but liberal diet is allowed and the treatment course lasts 10 days. After-treatment consists in taking 2 pills of yatren (grains 4 each) at night for 3 weeks; with gradual and careful return to full diet.

Of the 181 cases thus treated two only relapsed, and these obtained apparent cure on repetition of the combined treatment, but this time with 5 per cent. yatren clyster.

[In this abstract much important detail has perforce been omitted. Readers are advised to consult the paper itself.] H. M. H.

- i. MANSON-BAHR (Philip). **Amoebic Abscess of the Liver: its Diagnosis and Treatment. A Clinical Study.**—*Proc. Roy. Soc. Med.* 1931. Dec. Vol. 25. No. 2. pp. 233–242 (Sect. Trop. Dis. & Parasit. pp. 1–10).
- ii. KILNER (T. P.). **Operative Procedures in Amoebic Abscess of the Liver based on Recent Experiences.**—*Ibid.* pp. 242–245 (Sect. Trop. Dis. & Parasit. pp. 10–13).

i. A careful clinical study of 45 cases, fully reported and discussed, illustrating clearly the great variety of symptoms and physical signs which may proclaim [or too often hide] hepatic abscess; the value of emetine in hepatitis and hepatic abscess; and the treatment of hepatic abscess by aspiration.

ii. A detailed report on the procedures of exploration and aspiration of the liver in cases of hepatitis and hepatic abscess. Open drainage,

by rib resection, is reserved for those abscesses from which the aspiration pus has indicated definite secondary infection.

[Readers are advised to consult both these papers.] *H. M. H.*

REED (A. C.), ANDERSON (H. H.), DAVID (N. A.) & LEAKE (C. D.).
Carbarsone in the Treatment of Amebiasis.—*Jl. Amer. Med. Assoc.* 1932. Jan. 16. Vol. 98. No. 3. pp. 189–194. [Refs. in footnotes.]

In this important paper the authors give full details of 40 unselected cases of amoebiasis, some of them with acute dysentery ; in all presence of *E. histolytica* was demonstrated. Their observations lead them to conclude that with rigorous but arbitrary criteria of "cure" (the average follow-up period of the cases was $4\frac{1}{2}$ months) "carbarsone" meets more closely than any other drug now exploited the ideal requirements of an anti-amoebic agent. "Carbarsone" was first prepared by EHRLICH. It is 4-carbamino-phenyl-arsonic acid, containing 28.8 per cent. of arsenic. The recommended dosage is 75 mgm. per kilo in divided amounts over at least ten days. The arsenic in the compound seems to be rather slowly absorbed and eliminated after oral administration. Practically this dosage amounts in the average adult to 0.25 gram twice daily for ten days, given in gelatin capsules by mouth. It should not be used in amoebic hepatitis or in doses which might cause symptoms of arsenic toxicity [? dermatitis : ? jaundice]. It is clinically non-toxic in effective doses ; it may conveniently be administered orally without interference with the patient's usual way of life, it has no untoward side actions and it is comparatively cheap. There is no evidence as yet that it may be of prophylactic value.

H. M. H.

SOBHY (G.). **The Effect of Chronic Amoebic Infection on the Internal Functions of the Liver and the Application of this Knowledge in Therapeutics.**—*Jl. Egyptian Med. Assoc.* 1932. Jan. Vol. 15. No. 1. pp. 23–27.

Examination of a series of cases—(a) Chronic amoebic infection as proved by microscopical examination of stools and sigmoidoscopy ; 15 cases. (b) Acute amoebic dysentery, 5 cases. (c) Other parasitic dysenteries, bilharzial, etc., 3 bacillary cases ; 7 bilharzial cases. All thirty cases were subjected to following tests for liver function, viz. : Van den Bergh reaction ; nitrogen partition ratio ; laevulose tolerance curve ; Roger's glycuronic acid reaction ; Ehrlich's aldehyde reaction. All the 15 chronic amoebiasis showed marked deficiency of liver functions, whereas in all the rest these functions were shown to be intact.

In view of this result the author is dubious, indeed all but condemnatory, of the use of stovarsol in the cases, for arsenical preparations such as stovarsol are indubitable liver poisons.

H. M. H.

SPECTOR (Bertha Kaplan). **A Comparative Study of Cultural and Immunological Methods of diagnosing Infections with *Endamoeba histolytica*.**—*Jl. Preventive Med.* 1932. Mar. Vol. 6. No. 2. pp. 117–128. [15 refs.]

The author's conclusions drawn from her experimental data are :

(1) The following medium proved highly satisfactory for growing *E.*

histolytica; slants prepared from three parts of inactivated Wassermann-negative human serum and one part of 0.85 NaCl, overlaid with a mixture of one part sterile inactivated Wassermann-negative human serum and six parts of either NaCl or Ringer's solution. (2) In the detection of *E. histolytica* infections, cultural methods are probably superior to direct faecal examinations. (3) A negative complement fixation test for *E. histolytica* does not always signify the absence of infection with *E. histolytica*, because individuals vary in the formation of complement-fixing antibodies and because treatment with emetine sometimes alters the reaction. (4) Likewise, a positive complement fixation test may not signify an infection with *E. histolytica*. (5) Skin and precipitin tests are, as yet, inadequate for the diagnosis of *E. histolytica* infections. H. M. H.

HEGNER (Robert), JOHNSON (Carl M.) & STABLER (Robert M.).
Host-Parasite Relations in Experimental Amoebiasis in Monkeys in Panama.—*Amer. Jl. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 394–443. With 3 text figs. & 43 figs. on 6 plates. [25 refs.]

The subject is treated with great thoroughness and detail in a well illustrated and valuable paper. The work was begun at the Gorgas Memorial Laboratory in Panama City and completed at the Johns Hopkins University and the University of Pennsylvania. The material consisted of trophozoites of *E. histolytica* from human cases of intestinal amoebiasis, many cysts of *E. histolytica* from human carriers, and many monkeys belonging to 7 species, of which 10 brown howler monkeys, one red spider monkey, and one marmoset were successfully infected, spider monkey and 4 brown howlers with cysts *per os*, and the marmoset and 6 brown howlers with trophozoites *per rectum*.

(2) The authors propose a revised terminology for the types of *E. histolytica* encountered, on basis of localization and morphology—thus (i) tissue-dwelling amoebae, located in tissue of intestinal wall; (ii) lumen amoebae, living in lumen of intestine and not invading the wall; (iii) pre-cystic amoebae—either become cysts or are evacuated; (iv) stool amoebae—lumen amoebae that are evacuated; (v) degenerate amoebae—in tissues, lumen or stools.

(3) Their observations indicate that most of enormous numbers of trophozoites in the gut lumen do not come from tissues, as is generally believed, but are descendants of amoebae living only in lumen.

(4) Trophozoites of *E. histolytica* obtained through proctoscope do not form ectoplasmic pseudopodia, such as are usually described in stool amoebae, but advance rapidly in an even, continuous manner, the anterior end being a single broad pseudopodium. No ectoplasm is visible except when amoeba pauses or changes course, when ectoplasmic pseudopodia are advanced explosively at sides anterior to centre of body. Rate of locomotion averaged 240 microns per min. or 14.4 mm. per hour.

(5) Average size of trophozoites—stool amoebae 21.03 μ to 23.66 μ ; lumen amoebae 22.84 μ to 23.72 μ ; tissue amoebae 20.24 μ .

(6) Excystation *in vivo*; cysts of *E. histolytica* did not excyst in the colon of a brown howler monkey into which they were injected. Cysts injected into stomach showed no signs of excystation within 2½ hours in the stomach, but proceeded to excyst in the small intestine within from 2 hours and 20 mins. to three hours.

(7) Excystation: Cytoplasmic movement was first observed inside the cyst wall; then part of the protoplasm emerged through an

opening in the cyst wall but soon flowed back again ; this was repeated 6 or more times ; then the entire organism succeeded in escaping and leaving cyst wall behind. No division of the excysted amoeba was observed.

(8) Excystation of immature cysts. Stained preparations of material containing excysting amoebae revealed that uninucleate and binucleate as well as quadrinucleate cysts excyst.

(9) Changes in cysts in faeces after deposition. One stool contained 82 per cent. uninucleate, 9 per cent. binucleate, and 9 per cent. quadrinucleate cysts 5 hours after it was deposited. 22 hours and 20 minutes later it contained 59 per cent. uninucleate, 29 per cent. binucleate and 12 per cent. quadrinucleate cysts, thus demonstrating that development occurs in cysts after deposition. Development within cysts that had been injected *per os* into monkeys was very rapid. No correlation was found between size of cysts and number of nuclei contained in them. Size of nuclei in cysts containing different numbers of nuclei was very constant, the averages being 4.58μ for uninucleates, 3.08μ for binucleates, and 2.30μ for quadrinucleates. No constant arrangement of the nuclei within the cysts could be demonstrated. The amount of glycogen was greatest in uninucleates, least in quadrinucleates. Glycogen vacuoles were present in a higher percentage of uninucleates 5 hours after deposition (64 per cent.) than in uninucleates $27\frac{1}{2}$ hours after deposition (18 per cent.). Two cysts of *E. histolytica* were noted with 8, and one with 7 nuclei. Chromatoid matter was less abundant in quadrinucleate than uni- and binucleate cysts. Chromatoid matter decreased while cysts were in faeces outside body. Chromatoid bodies were often in pairs of equal size.

(10) No essential differences were observed in incidence of infection with intestinal protozoa between Rio Chico Indians of the Chucunaque Valley, and natives of Panamanian villages.

(11) No infections with *E. histolytica* were found in 8 dogs and 85 cats obtained from Panama villages.

(12) Twenty-four individuals belonging to 6 species of monkeys were inoculated with *E. histolytica* from man ; 12 monkeys belonging to 3 species were infected. Injuries of intestinal wall due to the amoebae were observed in all 12.

(13) In monkeys inoculated with cysts *per os*, the amoebae apparently penetrate the mucosa by breaking through the epithelial layer between the glands and by migrating by amoeboid movement either between basement membrane and glandular epithelium, or along fibres of membrana propria. During the migration cells of glandular epithelium are dislodged. The amoebae congregate under base of glands.

(14) Follicular ulcers appear to be of bacterial origin. No amoebae were found within these ulcers nor in the tissue surrounding them.

(15) Extensive migration of solitary amoebae occurs *post mortem* but no amoebae were observed within follicular ulcers. Groups of amoebae had wandered into the lymph spaces in the submucosa and muscle layers and into blood vessels.

(16) No amoebae were observed penetrating the muscularis mucosae and the material furnished no direct evidence as to how amoebic ulcers are formed in the submucosa.

(17) Infections with trophozoites inoculated *per rectum* were more severe and the lesions were produced much more rapidly than those of cysts *per os*. It is suggested that the trophozoites, which came from acute human cases were more virulent than those that emerged from

cysts from carriers. Furthermore the trophozoites were already mature and were placed directly at the primary site of infection; whereas the excysted amoebae had to divide and grow to maturity and migrate, or be carried to the primary site of infection from the small intestine.

(18) Lesions in a freshly fixed human appendix consisted of two small ulcers in the lymphoid tissue beneath the glands. These ulcers contained relatively few amoebae which were in contact with apparently normal lymphoid tissue. H. M. H.

FAUST (Ernest Carroll). **Experimental Amebiasis in Dogs.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 37-47. [22 refs.]

———. **Susceptibility, Resistance and Spontaneous Recovery in Dogs experimentally infected with *Endamoeba histolytica*.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Feb. Vol. 29. No. 5. pp. 659-661.

A study of infection of dogs with canine and human strains of *Entamoeba histolytica*; 65 dogs received inocula of canine strains and 20 of human strains. 93 per cent. of the former and 65 per cent. of the latter became infected. The prepatent period for canine strains averaged 8.4 days and for human strains 3.6 days. No clinical or pathological differences were observed between canine and human strains. Liver products had ameliorating effect on the course of the amoebic enteritis. The types of amoebic enteritis produced included acute fulminating dysentery; chronic enteritis; convalescent carrier conditions; temporary infection followed by apparent spontaneous recovery; and amoebiasis in animals which died of intercurrent animal and bacterial infections. Amoebic hepatitis was never observed in the series.

Site of lesions of amoebic enteritis in dogs, their depth and histological structure were on the whole comparable with lesions found in human amoebic enteritis. The author holds it probable that differences in type of amoebic lesions in kitten and in man are result of acuteness or chronicity of infection; a view substantiated by lesions in the dog, where an acute fulminating attack is produced by extensive shallow ulceration resulting in excessive absorption of toxins which at times causes death of the animal before the deeper lesion develops. Less active erosion over less extensive areas allows the amoebae to migrate down into the crypts, penetrate muscularis mucosae, invade deeper layers and form the undermining ulcer. H. M. H.

BACILLARY DYSENTERY.

BURNET (F. M.), MCKIE (Margot) & WOOD (I. Jeffreys). **A Study of Bacteriophage in Relation to Infantile Bacillary Dysentery.**—*Med. Jl. Australia.* 1931. Dec. 5. 18th Year. Vol. 2. No. 23. pp. 714-716. [10 refs.]

The authors conclude that administration of a highly active polyvalent Flexner bacteriophage had no influence on the course of infantile dysentery. Omitting cases due to Sonne strains and atypical Flexner types, there were 58 cases of true Flexner infections—25 treated, 33 controls. In the treated series 11 deaths occurred (44 per cent.); and in the controls 9 (27 per cent.). Clinically no definite good or bad effect

could be described to the use of phage, and the higher mortality in the treated series was probably fortuitous. More detailed analysis showed that age of patient and time elapsing between onset of disease and admission to hospital were much more important than administration of phage.

H. M. H.

KUROI (C.), SUZUKI (T.), MAI (H.), YOKOYAMA (Z.) & KAWASHIMA (T.). **Experimental Oral Vaccination against Dysentery.**—*Jl. Public Health Assoc. Japan.* 1932. Feb. Vol. 8. No. 2. pp. 1-3.

The vaccine, which is given in pill form, is prepared by concentration of a broth culture at 50°C. In this vaccine there is an admixture of typical and atypical dysentery strains.

W. F. Harvey.

MARTODIWIRIO (R. Soemardjo) & THIERFELDER (M. U.). Massa-behandelng met rivanol bij dysenterie-epidemieën. [**Mass Treatment with Rivanol in Epidemics of Dysentery.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Mar. 1. Vol. 72. No. 5. pp. 258-268. With 3 graphs.

Founding their judgment upon their experience in rural districts in Java the authors arrive at the following conclusions:—

- (1) Rivanol is a very useful drug in combating epidemics of dysentery (amoebic as well as bacillary).
- (2) Non-dysenteric intestinal catarrhs do well too under this treatment.
- (3) Being administered in small doses (adults 3 times per day 50 mgm. in pills, children correspondingly smaller doses) rivanol is cheap.
- (4) No untoward effects or idiosyncrasy against the drug was seen.
- (5) The native population is interested in this treatment and takes it willingly.
- (6) Its administration may be left to laymen.
- (7) The rivanol cure must be preceded by a laxative.
- (8) The faeces were free from amoebae after the course.
- (9) In fresh cases any other treatment is superfluous; in older serious cases combination with emetine or yatrien may be of use.
- (10) Even serious epidemics may be cut short by rivanol distribution.

W. J. Bais.

CASPARI (J.). Einige Bemerkungen zur Klinik der Kinderdysenterie in wärmeren Ländern (insbesondere zur Behandlung mit Emetin und Rivanol).—*Muench. Med. Woch.* 1932. Mar. 11. Vol. 79. No. 11. pp. 420-422.

CRAIG (Charles F.). Observations on the Use of Kendall's Medium in the Cultivation of *Endamoeba histolytica*.—*Proc. Soc. Experim. Biol. & Med.* 1932. Feb. Vol. 29. No. 5. p. 663.

DESCHIENS (R.). Indications pratiques sur le transport des formes végétatives d'amibes dysentériques.—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 207-210.

EGUCHI (J.). Efficacité du bilivaccin dans la prophylaxie de la dysenterie et de l'ekiri.—*Bull. Office Internat. d'Hyg. Publique.* 1932. Feb. Vol. 24. No. 2. pp. 297-299.

HIYEDA (K.). On Amoebic Dysentery in Manchuria.—*Jl. Oriental Med.* 1932. Mar. Vol. 16. No. 3. [In Japanese. English summary p. 37.]

- HOGUE (M. J.). The Effect of Four Amoebicidal Drugs on the Tissues of the Digestive Tract grown in Vitro.—*Amer. Jl. Trop. Med.* 1932. Mar. Vol. 12. No. 2. pp. 149-171. With 2 text figs. & 6 figs. on 3 plates.
- LEMIERRE (A.) & LÉVESQUE (Jean). Hippocratisme digital et amibiase intestinale.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Feb. 8. 48th Year. 3rd Ser. No. 4. pp. 154-156.
- MACFADYEN (J. A.). The Clinical Significance of Amoebiasis.—*South African Med. Jl.* 1932. Jan. 9. Vol. 6. No. 1. pp. 16-18.
- McKNEELY (T. B.). Amebic Infection in Louisiana and in the Marine Hospital at New Orleans.—*Milit. Surgeon.* 1932. Mar. Vol. 70. No. 3. pp. 270-272. [3 refs.]
- MURRAY (Florence J.) & KOH (P. K.). Amoebic Liver Abscess.—*Canadian Med. Assoc. Jl.* 1932. Mar. Vol. 26. No. 3. pp. 312-317.
- TSUCHIYA (H.). A Simple Culture Medium for *Endamoeba histolytica*.—*Proc. Soc. Experim. Biol. & Med.* 1932. Jan. Vol. 29. No. 4. pp. 347-348.
- VERDURMEN (A.). Dysenterie amibienne aiguë et arsenic.—*Bruxelles-Méd.* 1932. Feb. 28. Vol. 12. No. 18. pp. 509-510.
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BLACKWATER FEVER.

ROSS (G. R.). **Researches on Blackwater Fever in Southern Rhodesia.**—No. 6 of the *Memoir Series of the London School of Hygiene & Tropical Medicine*. 1932. pp. vi+262. With 24 charts & 1 map. [Numerous refs.] 1932. London: School of Hygiene & Tropical Medicine, Keppel Street, Gower Street, W.C.1. [10s. 6d. cloth; 8s. paper.]

This report deals with the work done by the author as Rhodesian Research Fellow during the four years April, 1925, to April, 1929. It is divided into three parts, the first of which is concerned with the epidemiology of the disease. In a chapter describing the distribution of blackwater fever in the population of Southern Rhodesia an interesting table is given recording the number of cases of the disease admitted to hospital, and the number of fatal cases during each of the years 1914 to 1928. The total cases numbered 679 and the deaths 152, giving a fatality rate of 22·2 per cent. It is perhaps significant that whilst the fatality rate varied greatly in different years, e.g. from 5 per cent. in 1924 to 36 per cent. in 1927, it showed no general tendency to decrease during the 15 years under consideration. During the 4 years 1914 to 1917, 198 cases were admitted to hospital and 48 (24·2 per cent.) died, whereas during the last 4 years of the period the figures were 147 cases and 41 (27·9 per cent.) deaths. These figures, which are by no means unique, might with great advantage be borne in mind by those who, being more highly endowed with optimism than with critical judgment, see fit from time to time to make outrageous claims for the success of particular lines of treatment based upon the observation of half a dozen cases, and occasionally, alas, only on one or two. This chapter, which contains much that is important, brings out clearly the intimate association of the disease with rural conditions. The higher incidence of the disease in rural inhabitants, as compared with urban inhabitants generally, and the high incidence in those engaged in pioneer occupations, both help to establish this fact.

The next chapter deals with the seasonal incidence and local distribution of blackwater fever and its correlation with meteorological conditions in Southern Rhodesia. It has been shown over a period of years that the incidence of blackwater fever tends to increase regularly in certain months. The curve of increase to the maximum and decline to the minimum follows with regularity the curve of the rainfall after an interval of three months. This chapter is followed by a lengthy discussion of the association between malaria and blackwater fever in Southern Rhodesia; and the conclusion of many previous observers that blackwater fever is a manifestation of malarial toxicity is substantiated.

The last two chapters deal respectively with quinine as an exciting cause of the disease, and with exciting causes other than malaria and quinine.

Part 2 is concerned with the blood and urine in blackwater fever. The author has rightly assessed the importance of examination of these fluids in any investigation designed with the object of elucidating some of the many mysteries of blackwater fever. In Chapter I the changes in the cellular elements of the blood and in the plasma are considered. While much valuable information has been collected, it is unfortunate that the author was unable to make any quantitative estimations on

the degree of haemoglobinaemia. The matter is of such importance for an understanding of the mechanism of the disease, and so many diverse statements, based frequently on the most slipshod and inadequate observation, appear in the literature of the subject, that new and carefully made quantitative estimations of the haemoglobin-aemia in blackwater fever are greatly to be desired. The next chapter contains a valuable collection of observations on the chemistry of the blood in malignant tertian malaria and blackwater; and this is followed by a chapter dealing with icterus in the two diseases.

Chapter 4 is concerned with the question of the relation of sarcolactic acid and blackwater fever. Ross finds himself unable to give support to the theory of BLACKLOCK and MACDONALD [see this *Bulletin*, Vol. 25, p. 901].

In the following section the changes in the urine are dealt with very fully. Summing up his observations on the all-important subject of the mechanism of suppression of urine in blackwater fever, the author writes as follows:—

"One is thus forced to conclude that suppression cannot be entirely explained by the assumption that it depends principally upon the sodium chloride content and the acidity of the urine. If the phenomenon is to be explained by purely physicochemical reasons, the part played by other electrolytes present in the urine would seem to be equally important to that played by sodium chloride. It seems preferable to adopt the view of Yorke and Nauss (1911) that precipitation depends upon the degree of concentration of the urine and is facilitated by any factor which interferes with the secretion of water by the malphigian body. This may result from damage as a result of the excretion of the foreign protein haemoglobin, from lowering of the blood-pressure, or for more obscure reasons."

Part 3 consists of clinical observations and of remarks on the prophylaxis and treatment of the disease. The remarks of the author on the subject of the alkaline treatment of blackwater fever are worthy of note. He writes, this method of treatment "has received most extensive publicity and there is some danger of its being regarded as a panacea. One fact, however, deserves emphasis. Despite the number of authors who have published their findings the total number of cases covered by their reports is small. Thus two report on one case, while in another instance two cases form the basis of the report. There is thus ample justification for the critical to wonder whether the ordinary probability of recovery is sufficiently allowed for." After a careful consideration of all the known facts, Ross sums up his views as follows:—

"In an earlier section of this report, the author has expressed himself as not wholly satisfied with the explanation of the mechanism of suppression as given by Baker and Dodds. While he agrees with these authors that, in *in vitro* experiment, precipitation of haemoglobin takes place according to the conditions they describe, he believes that the time necessary for precipitation to occur is such that it is difficult to imagine such changes taking place during the passage of urine down the renal tubule. He has stated his preference for the older view of Yorke and Nauss (1911) that precipitation depends upon the concentration of the urine and is facilitated by any factor interfering with the secretion of water by the malphigian body. He is thus not inclined to favour the alkaline treatment more than any form of treatment which has copious diuresis as its object."

In the reviewer's judgment, Ross is to be congratulated on an excellent piece of work. Not only has he made many valuable observations himself, but he has collected together from an enormous

and scattered literature the relevant observations of other workers and has brought the whole mass together into a single volume of moderate size, wherein it is possible to discover the present position of knowledge on any of the many problems which this mystifying disease presents. It is greatly to be hoped that the monograph will circulate widely amongst those who are interested in blackwater fever, and that it will be carefully read by anyone who contemplates writing on any aspect of the subject. Possibly its perusal may cause many to refrain from adding to an already over-burdened literature. From the reviewer's point of view this would be a most desirable result. In any case, the novice will at least realize that he is not the first to work on the disease, but that some facts are known, e.g. 75 per cent. of cases recover whatever treatment be administered, and consequently it is futile to advocate a certain method of treatment because two or three cases have recovered in spite of it. Careful study of the monograph will, however, do more than this; it will reveal to the serious student the gaps in knowledge, and will suggest to him lines along which he can with profit pursue his enquiries.

W. Yorke.

REVIEWS AND NOTICES.

KNOWLES (R.), GUPTA (B. M. Das) & BASU (B. C.). **Studies in Avian Spirochaetosis. Parts I & II.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1932. Feb. Memoir No. 22. 113 pp. With 11 plates (7 coloured) & 1 chart in text. [11 pages of refs.]

The first part of this memoir, comprising 48 pages, is devoted to a review of the previous literature and includes summaries of 180 papers on avian spirochaetosis. This is by far the most complete summary of the subject that has appeared, and will be invaluable to future workers, since much of the literature is very scattered and often difficult of access.

The second part is a detailed account of the authors' work on avian spirochaetosis in India. Their main results have been published previously [see this *Bulletin*, Vol. 27, p. 110] but the present memoir contains details of additional experiments and observations. Fowls were readily infected by the oral ingestion of infected material, either blood, ticks or the ova laid by infected ticks, in addition to the usual methods of inoculation including the percutaneous route. It is curious that the least efficient method of infection, with a 33.3 per cent. success rate, was exposure to the bites of infected *Argas persicus*.

The crisis seems to be the result of the production of agglutinins, immobilisins and lysins in the blood plasma, and within 48 hours after the disappearance of spirochaetes from the blood stream, all the organs, including the brain, were found to be free from the infection. As previously stated the authors were unable to find any evidence of the existence of any granule or spore formation in either the vertebrate or invertebrate host. They consider the so-called Balfour's granules the result of the extrusion of chromatin from the nuclei of erythrocytes poisoned by the toxins of the disease.

The life cycle in the tick is found to be the same as that previously suggested, namely the production of very fine "*tenue*" forms, by repeated division or multiple fission of the ordinary spirochaetes. These *tenue* forms invade the various organs, and especially the salivary glands and are considered the infective stage in the tick. Under the dark ground, or by special methods of staining, they show a very fine flagellum at each end.

The memoir should be read in its entirety by those interested in the subject. The authors' results, in the main, agree with MARCHOUX and COUVY's account of the production of very attenuated spirochaetes in the intermediate host. It is unfortunate that the authors failed to find any ocular evidence of infection in any of the eggs laid by infected ticks, although their own experiments confirm the undoubted fact that such hereditary transmission occurs. Apart from a single and very doubtful exception, figured in Plate X, nearly a thousand ova were examined with negative results and admitting the difficulty of seeing spirochaetes, especially *tenue* forms, inside the ovum, one would have expected them to have been found occasionally. The authors' belief that "spirochaetes always remain as spirochaetes morphologically" requires some modification in view of their own account, for the short and slender *tenue* form with a terminal flagellum at each extremity is markedly different from the ordinary spirochaete. Moreover among others, MARCHOUX and CHORINE [this *Bulletin*, Vol. 27, p. 701, and *C. R. Acad. Sci.*, Vol. 194, p. 917] have brought forward strong evidence in support of the view that the fowl spirochaete passes through a stage in which, although infective, it is no longer present as a spirochaete,

E. Hindle.

EISMA (Molle). De differentiatie van het derde stadium van de larven der ancylostomidae van mensch, hond en kat. [Differentiation of Third Stage Larvae of Ancylostomidae of Man, Dog and Cat.] [Thesis for doctorate, Univ., Leiden.]—pp. viii + 152. With 99 figs. (29 on 8 plates). English summary. 1932. Haarlem: Boekdrukkerij M. H. Groenendaal.

This doctorate thesis describes what is claimed to be a new staining method for infective hookworm larvae. Live larvae are placed between slide and cover and methylene blue solution run in. Its strength is: Methylene blue 0.3, sod. bicarb 0.1, aq. destill. 100. In it the larva becomes unsheathed and on slight warming stains dark blue. Decolourization is effected by running 30 per cent. acetic acid through the preparation. Alternate staining and decolourization are continued till the preparation is satisfactory. On this basis is reported an investigation of the infective larvae of *Ancylostoma duodenale*, *A. braziliense*, *A. caninum*, *Necator americanus* and *Uncinaria stenocephala*. The report concerns itself with "a description of the front view of the head, the amphids, the newly identified 'organa fissuriformia' lying ventrally and dorsally on a level with the aphids, the mouth cavity, the oesophagus, with the oesophageal glands and the so-called zone of closing cells [between oesophagus and intestine], the intestine, the primordium genitale, the nervous system, the primordia of the cervical glands, the muscular system, some undefinable cells, the papillae caudales, the skin and the sheath." There follows a biometric analysis and differentiation of the five larvae, and lastly a chapter dealing with some data for their quick differentiation. This affords a useful summary of present knowledge and so far as concerns the three hookworms which one may expect to find in man deals with larvae whose tail is longer than 98 μ . The generic differences are these:—

	Necator	Ancylostoma
Oral capsule	Sharply defined:— equally visible dorsally and ven- trally	Hardly visible: more marked dorsally then ventrally
Tail	Rather blunt ...	Pointed
Zone of closing cells ...	Leaves only a small space between oeso- phagus and intes- tine	Leaves a considerable space here
Beginning of intestine ...	Is its widest part ...	Is hardly so

As distinguishing the two ancylostomes the striation of the sheath is indistinct in *A. duodenale*, very distinct in *A. braziliense*.

Clayton Lane.

BENARROCH (E. I.). Estudios relativos al paludismo. VI. Metodos para el estudio del paludismo en Venezuela. [Methods of Malaria Investigation in Venezuela.] With English Foreword.—112 pp. With 52 text figs. (1 coloured). 1931. Caracas: Tipografia Americana.

In the foreword to this brochure the author states that in it "there is nothing new for English speaking scientists and technicians." There is, therefore, no need for a detailed review of the work. This is No. 6 of ten studies published on the subject of malaria in Venezuela, the others

including: An investigation of the anopheline vectors; the persistence and fluctuations of gametocytes in the peripheral blood (see this *Bulletin*, Vol. 26, p. 366); malaria in Bolívar; field studies; three papers on treatment.

The present article may be regarded as directions or hints for those setting out to investigate, in the laboratory or in the field. There are chapters on making and staining blood films, examining fresh blood, on the parasitic and splenic indices, on distinguishing *Anopheles* from *Culex* and the species of *Anopheles* from each other, dissection of mosquitoes, recording of topographical and other epidemiological data, etc., together with model forms for placing the information obtained on permanent record. A worthy addition to a useful series.

H. H. S.

The Nomenclature of Diseases drawn up by a Joint Committee appointed by the Royal College of Physicians of London. Sixth Edition being the Fifth Revision (Subject to Decennial Revision).—pp. xx+220 1931. London: H.M.S.O. [5s.]

The Nomenclature of Diseases (fifth edition) was somewhat roughly handled in this *Bulletin* [1918, Vol. 12, p. 363] so that we are glad to note that the many errors and omissions then noted are now rectified. Indeed the page of additions to Diseases caused by Infection or Infestation (p. 149) justifies the strictures, for more than twenty of the new entries are "tropical." Sir Andrew BALFOUR and Col. W. P. MACARTHUR served on the Revision Committee on this occasion and exotic diseases were not forgotten. The section headed Parasites and Vectors of Disease has obviously been subjected to careful revision and the Summary of Diseases and Vectors will be an interesting landmark of the knowledge of 1931. The book has been so carefully revised that, apart from the vexed question of zoological nomenclature, there is little for the critic. Rocky Mountain fever has failed to get indexed and climatic bubo has escaped mention altogether though its lengthy equivalent, lymphogranuloma inguinale, appears under Lymphatic Gland Diseases. The genus *Wuchereria* appears as *Wauchereria*.

A. G. B.

STRÜMPFELL (Adolf) & SEYFARTH (E.). **A Practice of Medicine.** Authorised Translation from the Thirtieth German Edition by C. F. MARSHALL, M.D., F.R.C.S. & C. M. OTTLEY, B.M., F.R.C.S. Vol. I. Infectious Diseases. Diseases of the Respiratory and Circulatory Systems. Vol. II. Diseases of the Digestive and Urinary Systems. Diseases of the Organs of Motion. Diseases of Metabolism. Vol. III. Diseases of the Nervous System.—pp. xxiii+2356. With 392 text figs. & 17 plates. 1931. London: Baillière, Tindall & Cox, 7 & 8, Henrietta Street, Covent Garden, W.C. 2. [£5 5s. 0d.]

This book is reviewed in *Bulletin of Hygiene*, 1932, Vol. 7, p. 326.

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1932.

[No. 9.

RABIES.

A REVIEW OF RECENT ARTICLES. XVII.*

i. *Virus.*

Further information regarding the epidemic in Trinidad which was described in detail in the previous review of this series (this *Bulletin*, Vol. 29, p. 187) is now available.

HURST and PAWAN¹ describe the histological and experimental findings relating to 5 cases in man, and 5 cases in cattle. A diagnosis of rabies was experimentally established in 3 of the human cases, and in all the cattle cases. The virus was transmitted to monkeys and in the brains of these Negri bodies were invariably found. Cross-immunity tests were carried out with fixed virus (Paris strain) and with two strains of Trinidad virus, one from a human case, the other from a cow. Immunization was carried out by Semple's method. The results show that immunization with fixed virus protected in a certain number of cases against the intracerebral inoculation of the Trinidad virus, whilst immunization with the Trinidad virus protected to a much lesser degree against fixed virus. The results of serum neutralization tests with the various sera against fixed virus, Trinidad virus, and a Paraguayan rabic virus supplied by REMLINGER, showed evidence of a similar cross immunity. In three of the human cases now reported there was a definite history of bite by a bat. This is however stated to be a not uncommon occurrence in Trinidad. "On the whole though final proof is lacking, the evidence available suggests the vampire bat as the vector of the disease." The lesions in the recent Trinidad human cases agree well with those recorded in the majority of cases of paralytic rabies. The spinal cord shows widespread nerve destruction with considerable microglial proliferation, and variable perivascular infiltration with exudation of polymorphs. The anterior and posterior horns are equally affected, thus differing from the appearances in poliomyelitis.

* For the sixteenth of this series see Vol. 29, pp. 187-195.

¹ HURST (E. Weston) & PAWAN (J. L.). A Further Account of the Trinidad Outbreak of Acute Rabic Myelitis: Histology of the Experimental Disease.—*Jl. Path. & Bact.* 1932 May. Vol. 35. No. 3. pp. 301-321. With 7 plates. [11 refs.]

A full report on the Trinidad virus is published by REMLINGER and BAILLY.² They have been able to transmit the infection with the greatest regularity to rabbits, guineapigs, dogs, cats, etc. It is a true rabies virus. The various characteristics of the Trinidad epidemic and epizootic are then discussed, as well as the mode of transmission.

TORRES³ has carried out a series of experiments by which the results which he previously reported (this *Bulletin*, Vol. 29, p. 188) regarding the identity of the viruses of Santa Catherina and Matto Grosso with the virus of rabies, are confirmed. From experiments on 14 laboratory animals, he has been able to show that vaccination with the virus of Santa Catherina prevented infection with street and fixed viruses, and that vaccination with street and fixed virus conferred immunity against infection with the virus of Santa Catherina. Also vaccination with the virus of Matto Grosso conferred immunity in the case of two guineapigs against fixed virus. Control animals inoculated at the same time with fixed virus developed rabies in 4 to 5 days, with street virus in 11 to 17 days, and with the virus of Santa Catherina in 9 to 11 days. The vaccines employed consisted of 15 per cent. emulsions of brain substance, glycerinated to 30 per cent., and containing 0.5 per cent. phenol. These were heated for 24 hours at 42°C. Nine doses of 3 cc. were given to each animal. The test doses were 0.2 cc. of a 1 in 10 emulsion of brain substance inoculated intra-cerebrally.

KRAUS and DURAN⁴ discuss epizootics of rabies amongst cattle and horses in South America. From the presence of Negri bodies in the brain, the infectivity of the brain substance when inoculated into rabbits and dogs, and the presence of Negri bodies in the brains of animals so inoculated, there can be no doubt that the virus of rabies is the causative agent. This virus differs in certain respects from the classic street virus. It is probably a variety of rabies virus. The epizootic is not spread by dogs. HAUPT and REHAAG consider that the carrier is the bat, and claim that the brains of bats contain Negri bodies and are infective when inoculated into rabbits.

A virus from a case of pseudo rabies has been examined by PATTO.⁵ It emanated from a cow which died in Varginha (Brazil) in 2 or 3 days after exhibiting symptoms of pruritus, hyperaesthesia and extreme agitation. When introduced into animals the virus induced in 2-5 days pruritus, hyperaesthesia, agitation, and aggressiveness, and death followed rapidly. Paralysis was rarely observed, and only as an agonal symptom. No Negri or Manouélian bodies, or other cell inclusions, were found post-mortem. Experimental transmission of the disease was most easily brought about by the subdural route. Vaccination with the virus conferred a definite immunity against

² REMLINGER (P.) & BAILLY (J.). Contribution à l'étude du virus de la Trinité.—*Bull. Acad. Méd.* 1932. Feb. 16. 96th Year. 3rd Ser. Vol. 107. No. 7. pp. 242-253. [11 refs.]

³ TORRES (Sylvio). A raiva no Brasil. Verificações sobre a imunidade crusada.—*Rev. Zootecnia e Vet.* 1931. Vol. 17. No. 3. pp. 266-270. French summary.

⁴ KRAUS (R.) & DURAN (Agustin). Ueber die in Südamerika vorkommenden Epidemien der Hundswut bei Rindern und Pferden (Mauleseln).—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 1/2. pp. 182-199.

⁵ PATTO (Ortiz). Estudo de um virus neurotrofo de pseudolyssa.—*Brasil-Médico.* 1931. Dec. 19. Vol. 45. No. 51. pp. 1190-1195.

the disease, but not against the virus of rabies (2 guineapigs), and vaccination with rabies virus did not protect against the virus in question (2 guineapigs).

NICOLAU, MATHIS, and CONSTANTINESCO⁶ have made a detailed study of a strain of virus of Oulou-Fato recovered from the brain of a child which died at Dakar 36 days after having been bitten on the forearm, and at the 16th day of Pasteurian treatment, without exhibiting the usual acute symptoms of rabies. Inclusion bodies resembling Negri bodies were found in the brain; inoculation into the brains of two rabbits produced paralysis and death, Negri bodies being observed in the brain substance, whilst inoculation of the virus after three passages through rabbits, did not affect a rabbit which had been previously immunized against rabies. The virus was fixed with difficulty after a series of 20 subpassages through rabbit's brain. The incubation periods were as follows: 21, 20, 23, 18, 14, 12, 12, 11, 10, 9, 10, 8, 8, 9, 9, 8, 7, 8, 9 and 8 days. The characteristics of the strain in its original form are stated to be (1) feebleness of pathogenic action, (2) slow centrifugal dissemination along nerve paths, seldom reaching the salivary glands, (3) dilution greater than 1 in 500 did not convey infection subdurally. Though the saliva of the biting animal in the case of oulou-fato may often be avirulent, a course of antirabic treatment should, in the opinion of the authors, always be given to persons bitten by animals suffering from this form of rabies.

REMLINGER⁷ wisely, in our opinion, criticizes the conclusions which NICOLAU and his co-workers have drawn. He does not admit from the shortness of the incubation in the child that the strain was attenuated. He does not admit that failure to find evidence of infectivity in the saliva is a proof of slow centrifugal dissemination, as such infectivity is known to be irregular. Difficulties in fixing strains of ordinary street virus are frequently met with. Some fix rapidly, some slowly. NICOLAU replies to this criticism, at the end of REMLINGER's paper.

A strain of street virus from Brazzaville (French Equatorial Africa) has been examined by VAUCÉL, BOISSEAU, and SALAÛN⁸ by crossed immunization experiments, which show that, as in the case of the strain from French West Africa examined by REMLINGER, it is identical with the rabies virus of Europe. "The only difference between the viruses of Africa and the virus of Europe is the lower virulence of the former for man."

REMLINGER and BAILLY⁹ discuss the endemicity of rabies in Morocco. In general it is believed that the rabies of Africa and of Western Europe is less virulent in type than that of Russia, the Balkan States, and of Asia. But in the last few years a number of fatal cases have occurred in Morocco in spite of treatment. The authors considered

⁶ NICOLAU (S.), MATHIS (C.) & CONSTANTINESCO (Val.). Sur un virus de l'Oulou-Fato (maladie du chien fou) isolé chez l'homme.—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 931-939. [Refs. in footnotes.]

⁷ REMLINGER (P.). L'Oulou-Fato n'est-il qu'une rage atténuée?—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 118-122.

⁸ VAUCÉL (M.), BOISSEAU (R.) & SALAÛN (G.). Rage canine en Afrique Equatoriale Française. (Identité du virus rabique de Brazzaville et du virus fixe de l'Institut Pasteur de Paris.)—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 191-196.

⁹ REMLINGER (P.) & BAILLY (J.). La rage et le virus rabique au Maroc.—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 289-294.

it advisable to examine the virulence of various Moroccan strains with the object of determining whether the virulence of these strains was higher than normal. Virulence was tested by observing the incubation period in rabbits which had been inoculated subdurally with street virus. The results are as follows :—

- (1) Virus of Tangiers: 48 brains tested: average incubation 14 days.
- (2) Virus of Interior of Morocco: 14 brains tested: average incubation 17 days.
- (3) Virus of Gibraltar: 6 brains tested: average incubation 16 days.

The average incubation periods when the virus was introduced into the muscles of the neck of guineapigs were respectively 18·7, 19, and 18 days. It appears then that the rabies of Morocco does not differ from that of western Europe.

BRANCHINI¹⁰ has succeeded in subpassaging fixed virus of the rabbit through a series of 17 dogs, the inoculation being performed by the intraocular route. There was no shortening of the incubation period, which varied irregularly throughout the series. The periods from inoculation to death were as follows: 17, 10, 11, 19, 14, 10, 12, 8, 12, 17, 12, 14, 8, 9, 10, 16, 7, 14, 10, 11, —, 16 and 7 days. The period of incubation did not appear to vary with the breed, or the condition of the dogs.

It may be remembered (this *Bulletin*, Vol. 22, p. 243) that NICOLLE and BURNET attempted to reverse the alteration of street virus into fixed virus, which is brought about by passage in rabbits, by passaging fixed virus through dogs. At that time they had reached the 11th passage and had observed no modification. It is reported by NICOLLE and BALOZET¹¹ that the experiment has been continued throughout the interval of eight years and that the virus has now reached its 106th passage through dogs. No restoration of street virus characteristics has occurred. The period of incubation varies from 4 to 7 days; and no Negri bodies have appeared in the brain of the dog. This result was adumbrated in my previous review (Vol. 22, p. 243).

A strain of virus of exalted virulence is described by BABLET and MARNEFFE.¹² A European bitten superficially at the base of the thumb died in spite of treatment after a period of 20 days. The symptoms were not definite enough to permit of an exact diagnosis, but inoculation into rabbits removed all doubts. The rabbits developed rabies in 8 days with typical paralysis.

The influence of five methods of dilution on the rabies virus has been investigated by SCHNEIDER and SALEM.¹³ In the first one part of brain was emulsified in two parts of a solution containing equal parts of glycerine and physiological saline. In the second one part

¹⁰ BRANCHINI (B.). Sul virus fisso di cane.—*Pathologica*. 1931. Dec. 15. Vol. 23. No. 482. pp. 730–734. English summary (6 lines).

¹¹ NICOLLE (Charles) & BALOZET (L.). Essai de restauration du virus rabique fixe par passages intracérébraux sur le chien.—*C. R. Acad. Sci.* 1932. May 17. Vol. 194. No. 20. pp. 1706–1708.

¹² BABLET (J.) & MARNEFFE (H.). Un cas de rage produit par un virus rabique des rues à virulence renforcée observé à Hanoi.—*Ann. Inst. Pasteur*. 1932. Mar. Vol. 48. No. 3. pp. 301–307.

¹³ SCHNEIDER (J. E.) & SALEM (L.). Rabies Virus as affected by Certain Diluents.—*Jl. Amer. Vet. Med. Assoc.* 1931. Nov. Vol. 79. No. 5. pp. 642–644.

of brain was emulsified in two parts of distilled water. In the third one part of brain was emulsified in two parts of salt solution. The emulsions were strained through 60 mesh bolting cloth. The third portion was further subdivided in 3 parts called parts 3, 4 and 5. To part 4 was added 1 per cent. chloroform, and to part 5, 1 per cent. of 90 per cent. phenol. After cold storage for 100 days with daily shaking, the various parts were tested for virulence. Before testing, each was diluted with an equal quantity of physiological saline. Two rabbits were inoculated with each of the 5 emulsions, the dose in each case being 0.1 cc. The 2nd and 3rd samples (diluent distilled water and salt solution respectively) invariably induced rabies in 6 and 7 days. The 1st, 4th and 5th samples failed to induce rabies within 20 days.

ii. Symptoms.

In the course of experiments on the virulence of spleen, liver and kidney of rabid animals REMLINGER and BAILLY¹⁴ have observed symptoms of an unusual nature in certain guineapigs, particularly when the virus employed was an exalted strain from a cat. Certain of the guineapigs inoculated developed rabies of the usual type in 8 to 70 days. Others in the 3rd, 4th or 5th week showed emaciation, listlessness, loss of appetite, and sometimes fleeting paresis, and died in the course of 24 hours or even less. Subpassage into rabbits was not effective. Of 129 guineapigs thus inoculated, 19 died of rabies, 38 with the above symptoms, and 72 survived. On the other hand of 30 rabbits inoculated with similar material, 8 developed rabies, 2 died with the above symptoms (subpassages negative) and 20 survived. Apparently the guineapig is the more susceptible animal. The authors refer to the cachexia which follows the inoculation of filtrates of brain substance and leads to a similar fatal termination. "Invariably in these animals the passages are negative." REMLINGER in 1904 considered that these accidents were due to the toxin of rabies. "We are to-day a little less affirmative."

Two unusual cases of rabies are described by STUART and KRICKORIAN.¹⁵ The first is one in which the incubation period was prolonged (12 months). The second is that of a man bitten by a calf which had symptoms suggestive of rabies (difficulty of swallowing, and progressive weakness of limbs). Rabies in the calf was diagnosed by laboratory methods. The man was not treated, and developed rabies 4 months after the bite. "With regard to this patient, it seems right to emphasize that at no time previously had he been exposed to any risk of infection with rabies virus." This is an extremely unusual case. (See this *Bulletin*, Vol. 21, p. 714 for a similar case reported by OUCHAKOFF).

[The fact that certain species of animals though freely susceptible to rabies, appear only very rarely, if ever, to transmit the disease in nature, is one of great interest. The rat, for example, is highly susceptible to infection by laboratory methods; that it does not transmit infection in nature is a fact for which we may be profoundly thankful. The Trinidad experience suggests that the vampire bat may not be

¹⁴ REMLINGER (P.) & BAILLY (J.). Sur les accidents mortels observés chez des cobayes inoculés avec des organes d'animaux morts de rage.—*C. R. Soc. Biol.* 1931. Dec. 4. Vol. 108. No. 35. pp. 859-861.

¹⁵ STUART (G.) & KRICKORIAN (K. S.). Unusual Development of Rabies Symptoms in Man.—*Ann. Trop. Med. & Parasit.* 1932. Mar. 19. Vol. 26. No. 1. pp. 55-64. [24 refs.]

so harmless. The reason why in nature certain species do or do not transmit infection may lie in the habits of the animals concerned, but the view of MANOUÉLIAN and VIALA (this *Bulletin*, Vol. 25, p. 707) that the infectivity of saliva depends upon the presence in it of ganglia cells containing virus suggests that a comparative study of the histology of the glands and the salivary apparatus in the various animals might prove of interest].

iii. Pathology.

A finding of great interest is reported by NICOLAU and KOPCIEWSKA.¹⁶ The accepted view that Negri bodies are not present in the hippocampus in fixed virus rabies in the rabbit, rests upon evidence deduced from sections stained for the most part by the method of Mann. The authors find that using the slow method of Giemsa (as advocated by LEVADITI, NICOLAU, and SCHOEN this *Bulletin*, Vol. 24, p. 760) Negri bodies may be found with constancy but in small numbers in the horn of Ammon. They measure 4 to 6 or 7 μ ., and have the characteristic internal structure. They have been found in rabbits infected both with the Paris strain of fixed virus, and with the D.K. and Mathis strains. Whilst they are of rare occurrence in the horn of Ammon, they are much more numerous in the "noyau optique basal."

"This formation lies under the optic chiasma, or under the optic tract, and consists of a large number of ganglion cells. These cells appear to react more actively, during the course of fixed virus rabies, by the formation of Negri bodies than do the other nerve cells of the encephalon." The authors have examined the brains of over 60 rabbits dead of fixed virus rabies. In each case 100 neurones of the basal optic nucleus, and 100 neurones of the hippocampus were scrutinized. The following numbers of Negri bodies were found:-- With the Paris strain of fixed virus: 36 in the former and 1 in the latter; 58 and 3; 23 and 0.5 (200 neurones were counted in this case) 27 and 2 etc. With the D.K. strain the numbers were 23 and 5, 57 and 4, 63 and 2, etc. With the Mathis strain 122 and 3, 87 and 6, 172 and 9, 69 and 5, etc. The relative proportions in street virus rabies are similar. As many as 4 or even 5 Negri bodies may be found in the same nerve cell in fixed virus rabies of the rabbit in this seat of election.—[It would appear that the seat of election described by THOMAS and JACKSON (this *Bulletin*, Vol. 28, p. 744) lies somewhat posterior to the group of ganglion cells described above. The importance of searching for Negri bodies in this region is thus further emphasized.]

The pathological anatomy of the brain of a man who died of rabies 6 to 7 days after the first appearance of symptoms is described by ROJAS.¹⁷ He considers that the changes are extraordinarily similar in type and extent to those observed in the acute phase of epidemic encephalitis. The histological appearances are described in detail, and the communication is fully illustrated.

¹⁶ NICOLAU (M. S.) & KOPCIEWSKA (L.). Zone élective pour les corps de Negri chez les lapins morts de rage expérimentale à virus fixe.—*C. R. Acad. Sci.* 1932. May 23. Vol. 194. No. 21. pp. 1865–1867. With 4 text figs.

¹⁷ ROJAS (Luis). Ein Beitrag zur pathologischen Anatomie der Lyssa beim Menschen.—*Arch. f. Psychiatrie.* 1932. Jan. 22. Vol. 96. No. 1. pp. 1–23. With 14 figs. [30 refs.]

The histological appearances in the brains of rabbits which have received a course of antirabic treatment by the method employed at the Pasteur Institute of Paris are described by NICOLAU, CRUVEILHIER and KOPCIOWSKA.^{18,19} These are mainly an interstitial infiltration of the basal region by mononuclear cells from the meninges. The cells are often grouped round the neurones like satellites. These histological modifications are most intense in rabbits killed from 1 to 17 days after the 15th injection of fixed virus. Thereafter they appear to diminish. They are not observed in the case of control animals treated with emulsions of normal brain.

In a second paper this research is further elaborated. The authors consider that the reactions observed are due to "a very light infectious process engendered by the virus-vaccine." The reactions consist in (a) a mobilization of the elements of defence—lymphocytes, plasma cells, macrophages, microglia cells, and proliferation of the capsular cells of the spinal ganglia; (b) a peculiar disposition of Nissl bodies in the neurones of the spinal ganglia and the medulla; and (c) a swelling of the nucleus in certain nerve cells.

SCHWEINBURG²⁰ has examined the infectivity of the liver, spleen, pancreas, adrenals, sciatic nerve and blood of 20 laboratory animals which died of fixed virus rabies, and 30 which died after inoculation with street virus. The percentages of infections were as follows:—

	Street virus.	Fixed virus.	Both viruses.
Sciatic Nerve	33	20	28
Adrenals	30	5	20
Spleen	23	5	16
Pancreas	17	0	10
Liver	7	0	4
Blood	3	0	2

In 3 out of 12 animals inoculated with street virus, and in 2 out of 8 inoculated with street virus, the testicles were found to be infective. In many of the positive cases the clinical picture in the first passage was uncertain, and further subpassage was necessary before a definite diagnosis could be made. The infectivity of the various organs was independent of the clinical type of the disease in the parent animal, and its type in the test animal was also independent of the organ inoculated. The experiments shed no light on the conditions which determine the type of the disease.

An interesting study of the antigenic properties of rabies virus has been made by HAVENS and MAYFIELD.²¹ Immune sera were examined

¹⁸ NICOLAU (S.), CRUVEILHIER (L.) & KOPCIOWSKA (L.). Modifications histologiques provoquées par la vaccination antirabique dans le système nerveux des lapins.—*C. R. Soc. Biol.* 1931. Dec. 4. Vol. 108. No. 35. pp. 871–875. With 2 text figs.

¹⁹ NICOLAU (S.), CRUVEILHIER (L.) & KOPCIOWSKA (L.). Interprétations des modifications histologiques provoquées par la vaccination antirabique dans le système nerveux des lapins.—*C. R. Soc. Biol.* 1931. Dec. 11. Vol. 108. No. 36. pp. 937–940. With 2 text figs.

²⁰ SCHWEINBURG (Fritz). Ueber den Nachweis von Lyssavirus in verschiedenen Organen.—*Zent. f. Bakt. I. Abt. Orig.* 1932. Feb. 3. Vol. 123. No. 7/8. pp. 434–448. [12 refs.]

²¹ HAVENS (Leon C.) & MAYFIELD (Catherine R.). The Antigenic Properties of Rabies Virus.—*Jl. Infect. Dis.* 1932. Apr. Vol. 50. No. 4. pp. 367–376.

by flocculation and complement fixation tests. The sera of 6 rabbits immunized with fixed virus caused flocculation of a 1 per cent. suspension of fixed virus brain substance in appropriate dilutions, but had no effect on similar suspensions of vaccinia virus brain, or of normal brain. And conversely, the sera of rabbits immunized against vaccinia caused flocculation of vaccinia virus brain but not of normal brain, nor except in very high concentration of rabies virus brain. It was observed that flocculation of rabies virus brain was more slowly brought about (6 to 24 hours) than that of vaccinia virus brain (2 to 6 hours). Immunization by injections of killed rabies virus was apparently as effective as immunization with living. The flocculation test was then applied to the brains of 16 rabid animals in whose brains Negri bodies were present. The immune serum caused flocculation in 15 of these, whilst it had no effect on the brain material of 19 dogs, one cat, and two cows which showed no evidence of rabies on microscopical examination.

Attention was then turned to complement fixation tests, using the "cocto-antigen" of KRAUS and MICHALKA (this *Bulletin*, Vol. 24, p. 224). The anticomplementary effect of rabbit serum is well known. The six rabies immune sera prepared in rabbits were all anticomplementary within the specific range of the sera as shown by the flocculation tests. To avoid this difficulty immune sera were prepared in the guineapig. Preliminary flocculation tests showed that the guineapig was more difficult to immunize against fixed virus than the rabbit; the titres were much lower. Complement fixation tests however showed (1) that normal brain tissue did not react with immune guineapig serum; (2) that the rabies immune sera fixed complement with rabies antigens but not with vaccinia antigen; and (3) that vaccinia immune sera fixed complement with vaccinia antigen but not with rabies antigens.

iv. *Methods of Treatment and Statistics.*

SATO and KODAMA²² have carried out some interesting experiments on the purification of rabies virus by kaolin adsorption. An emulsion of fixed virus brain substance in dilution 1 in 10 was prepared. After having been frozen and thawed repeatedly to ensure that the cells were broken up, the emulsion was centrifuged for $\frac{1}{2}$ an hour at 3,500 revolutions per minute, and the supernatant fluid was withdrawn and again diluted ten times. It appeared from initial experiments that adsorption of the virus from this fluid by kaolin took place most readily when the reaction was neutral or slightly acid, and that elution was most complete at a pH between 9.5 and 10.5. By successive adsorption and elution a purified vaccine was prepared from which the larger portion of tissue proteins had been removed. Little loss of virulence resulted from a single purification, but after three such treatments some slight loss occurred. The purified virus passed readily through Mandler's V, N and W, and Chamberland L1 and L2 filters at a pH of about 9.0.

In 1928 ABADJIEFF showed that fixed virus was killed by the action of a 5 per cent. solution of yatren in 3 hours at 37°C. (This *Bulletin*, Vol. 25, p. 708). He has now²³ used this killed vaccine in the treatment

²² SATO (Shimichi) & KODAMA (Takeshi). Purification of Fixed Rabies Virus and Vaccinia Virus by Adsorption on Kaolin.—*Kitasato Arch. Experim. Med.* 1931. July. Vol. 8. No. 3. pp. 287-302.

²³ ABADJIEFF (Boris). Tollwut-Yatrenvaccine.—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Jan. 16. Vol. 113. No. 2 & 3. pp. 582-585. With 1 text fig.

of 2,980 bitten persons. Of these 4 died—that is to say the mortality was 0·13 per cent.—and one case of transitory post vaccinal paralysis was observed. The method of preparation of the vaccine is as follows:—A 10 per cent. emulsion of brain substance in 4 per cent. yatren solution is prepared. This is placed in the incubator for 24 hours at 37°C. After testing for sterility the resulting suspension is diluted to 1 in 4 with 2 per cent. yatren solution, and filtered through gauze. Fifteen daily doses varying from 0·25 to 2·5 cc. are administered in cases of average severity, and in severe cases three further injections of 3, 3, and 4 cc. are given. The amount of brain substance for treatment of ordinary cases is 700 mgm.

VIALA²⁴ reports that of 531 persons treated at the Pasteur Institute at Paris none developed rabies, and no accidents of any sort occurred.

The activities of the Pasteur Institute at Riga are described by ADELHEIM.²⁵ From 1914 to 1930, 6,021 persons have been treated with cords dried for 24 hours, and preserved in glycerine. Eight of these contracted rabies (i.e. a mortality of 0·13 per cent.). No complications have been reported.

The method of Högyes-Phillips has been employed in Bulgaria by ABADJIEFF²⁶ from April 1929 to December 1930. Of 2,484 persons treated two died of rabies, that is to say the mortality was 0·08 per cent. No post-vaccinal paralysis were observed.

OUCHAKOV²⁷ gives statistics of treatment during the year 1929 at the Institute of Experimental Medicine (Leningrad), of 1,283 persons, of whom 4 (0·3 per cent.) died of rabies. The vaccine employed was that of Fermi, and it was also sent out to 15 subordinate treatment centres. At these 1,709 persons were treated with one fatality (mortality 0·06 per cent.).

The first review of antirabic statistics compiled at the instance of the Paris Conference of 1927, by the League of Nations (MCKENDRICK) is reviewed by HESSE.²⁸ (See also this *Bulletin*, Vol. 28, p. 247). In a second paper HESSE²⁹ gives statistics relating to the German Pasteur institutes for the year 1931.* 174 individuals have received treatment, and in all cases the treatment has been successful. No paralytic accidents have been observed.

v. Post Vaccinal Accidents.

The clinical features of 20 cases of post-vaccinal paralysis which have occurred at Cairo since 1910 are described by MOFTAH and

²⁴ VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1931.—*Ann. Inst. Pasteur*. 1932. May. Vol. 48. No. 5. pp. 676-679.

²⁵ ADELHEIM (R.). Ueber die Tätigkeit des Pasteur-Institutes (Wutschutzstation) zu Riga.—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Mar. 19. Vol. 113. No. 4. pp. 690-699.

²⁶ ABADJIEFF (Boris). Die Tollwutbehandlung in Bulgarien nach der Methode von Högyes-Phillips.—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Jan. 16. Vol. 113. No. 2 & 3. pp. 406-410.

²⁷ OUCHAKOV (V.). Service antirabique de l'Institut de Médecine expérimentale. (Rapport annuel pour l'année 1930).—*Arch. Sci. Biol.* 1931. Vol. 31. No. 4. pp. 417-428. [In Russian. French summary.]

²⁸ HESSE (Erich). Neue Tatsachen zur Wutschutzbehandlung.—*Arch. f. Soziale Hyg. u. Demographie*. 1931. Vol. 6. No. 2. pp. 127-133.

²⁹ HESSE (Erich). Die Tätigkeit der deutschen Wutschutzstationen im Jahre 1931.—*Reichs-Gesundheitsblatt*. 1932. May 4. Vol. 7. No. 18. pp. 300-303.

NABIH.³⁰ During the period in question 27,060 persons were treated. (In a further case the biting animal—a camel—did not develop rabies when under observation. The patient received no vaccinal treatment, but was given a dose of 10 cc. of a serum which is once referred to as antirabic, and twice as antitetanic). The sequence of these cases is interesting. During the period 1910 to 1926, 13 cases occurred, varying in degree from a slight facial paralysis to a severe Landry's ascending paralysis. All recovered after a convalescence more or less prolonged. During the period 1928 to 1931, 7 cases of post-vaccinal paralysis occurred, and these all terminated fatally. The treatment employed up to the date of occurrence of the 5th death was a modification of the method of Högyes. [From papers furnished to the Paris Conference the modification is described as follows: Cords are preserved in glycerine for a week, and are then made up with physiological saline in dilutions of 1/280, 1/240, 1/200, 1/160, 1/120. These are administered according to various schemes of dosage over periods varying from 15 to 21 days]. Thereafter vaccines killed by phenol were employed, but a further case occurred with the same characteristics of an acute myelitis as its predecessors and also terminated fatally. That the vaccine was killed, was shown by the fact that subdural inoculation did not infect the rabbit.

In three cases an autopsy was carried out, and from these the authors state that "many experiments on rabbits and monkeys were performed. The emulsions have been injected without result under the dura mater, into the muscles and under the skin." After excluding the possibility of either fixed virus or street virus being the causative agent, the authors fall back upon a toxin. [The time relations of the various fatal cases appear to us to be of importance. They are as follows :—

	Age.	Period of treatment.	Date of death.
1.	30	21.3.1928 to 10.4.1928	23.4.1928
2.	15	14.11.1928 to 4.12.1928	5.12.1928
3.	12	18.12.1928 to 7.1.1929	10.1.1929
4.	35	17.1.1929 to 2.2.1929	1.2.1929 (?)
5.	12	21.1.1929 to 7.2.1929	11.2.1929
6.	35	22.1.1929 to 11.2.1929	14.2.1929
7.	13	Nil	13.5.1929 (only Antitetanic serum given.)
8.	17	19.1.1931 to 8.2.1931	10.2.1931

Thus 5 of the deaths of treated persons occurred within the period of three months from December 1928 to February 1929, and in fact three of the persons who died were under treatment at the same time. The probability on the basis of pure chance that in one period of three months five deaths should occur, whilst in eighty previous periods during which the same method of treatment was employed, only one fatal accident was observed, is of the order of 1 in 10,000,000. It would thus appear that some unusual factor had come into operation during the period in question].

The effects of the injection of normal brain substance into rabbits and their bearing on the aetiology of paralytic accidents have been

³⁰ MOFTAH (S. G.) & NABIH (M. S.). Sur 21 cas de paralysie rabique.—*Bull. Office Internat. d'Hyg. Publique.* 1931. Nov. Vol. 23. No. 11. pp. 2007-2016.

studied by HURST.³¹ In his experiments suspensions of foreign brain material of guineapigs (5), sheep (5), human beings (15), and monkeys (20) were employed. These were either untreated, or modified by moderate heating, or by carbolic acid. Dosage varied within wide limits. Certain of the animals died of an obvious infection, others (the majority of the fatal cases) died without any important microscopical lesions, and a smaller group of four died with symptoms of paralyses. In the latter group "no lesions of any degree could be found; in every case the vertebral column was normal, and despite the most diligent search no cause for a paralysis, in one instance preceding death by 5 days, could be determined." Two rabbits injected for other purposes with haemolytic sera developed precisely similar symptoms, and were killed after 9 days. Again no histological condition accounting for the paralysis was found. "From this experience it seems extremely improbable that in our own cases the nervous trouble was directly attributable to the brain substance injected." The author concludes that the parenteral introduction of such brain emulsions into rabbits causes severe toxic manifestations leading to wasting and death, but that there is insufficient evidence to warrant the view that the paralytic accidents of antirabic treatment are directly due to the foreign nervous substances injected. "There are good grounds for believing that in many cases the human lesions in cases of paralytic accident are identical with those of the disseminated encephalo-myelitis following the exanthemata, in which event it can hardly be held that the brain injections (or, as the case may be, the viruses of vaccinia, etc.) do more than stimulate into activity some latent factor or factors which are truly responsible for the nervous disability. Even if, as statistical evidence seems to show, paralytic accidents are a function of the quantity of brain substance administered, this may only mean that the activation of the second factor is favoured by a greater degree of toxæmia."

Three cases of persons treated by Adelheim's method (2 cc. daily of a 3-4 per cent. emulsion of cord dried for 24 hours) each of which showed a local erythematous reaction at the site of inoculation and each of which received treatment on subsequent occasions, are described by KAKTINE.³² The first case was inoculated in 1902, 1908, 1914, 1916, 1920 and 1925; with each treatment the reaction became progressively weaker. The second was treated in 1923, 1924, 1926, 1927 and 1930 and showed a similar weakening of reaction. The third treated in 1922, 1923 and 1926 showed the same phenomenon.

vi. Rabies in Animals.

REMLINGER, MANOUÉLIAN and BAILLY³³ in continuation of an earlier research (this *Bulletin*, Vol. 27, p. 252) now show that street virus inoculated into the brain of the tortoise (*Testudo mauritanica*) may lie dormant without causing any symptoms in the animal for a longer period than the 110 days previously observed. In the case

³¹ HURST (E. Weston). The Effects of the Injection of Normal Brain Emulsion into Rabbits, with Special Reference to the Aetiology of the Paralytic Accidents of Antirabic Treatment.—*Jl. Hygiene*. 1932. Jan. Vol. 32. No. 1. pp. 33-43. [35 refs.]

³² KAKTINE (A.). Traitement antirabique réitéré et réactions locales.—*C. R. Soc. Biol.* 1931. Nov. 20. Vol. 108. No. 33. pp. 735-737.

³³ REMLINGER, MANOUÉLIAN & BAILLY. Recherches sur les centres nerveux de la tortue inoculée de virus rabique.—*C. R. Acad. Sci.* 1931. Nov. 30. Vol. 193. No. 22. pp. 1122-1124.

of three experiments, the brain was infective after 207, 163, and 163 days respectively. Subpassage into rabbits (two from each) induced symptoms in from 9 to 11 days. In every case Negri bodies were found in the nervous system.

A statistical summary of the results of preventive inoculation of dogs in seven prefectures in Japan since 1916 is given by Shinkichi UMENO and Sanae UMENO.³⁴ The methods employed have been variously those (1) of OSHIDA (1 part of fixed virus rabbit brain substance in 10 parts of 0.5 per cent. phenolated glycerine water), (2) of KONDO (1 part of brain substance from dogs infected with rabbit fixed virus in 6 parts of 0.5 per cent. phenolated glycerine water, incubated for 3 days), and (3) that of UMENO (1 part fixed virus rabbit brain substance in 6 parts of 0.5 per cent. phenolated glycerine water incubated for 3 days). The continued figures relating to the seven prefectures are as follows:—

Results of the Rabies Preventive Inoculations on Dogs in Seven Prefectures.

Rabic dogs among					
	No. of dogs inoculated.	Inoculated.	Non- inoculated.	Stray dogs.	Total.
1916	—	—	326	277	603
1917	823	—	394	248	642
1918	8,500	—	452	314	766
1919	33,999	15	253	294	562
1920	27,043	4	150	213	367
1921	46,216	17	266	242	525
1922	33,830	20	185	122	327
1923	35,215	9	116	92	217
1924	47,449	43	481	509	1,033
1925	95,458	49	757	574	1,380
1926	102,677	32	437	369	838
1927	99,169	24	217	165	406
1928	97,597	15	47	36	98
1929	69,981	3	7	6	16
Total	697,957	231	4,088	3,461	7,780

Notes.—The figures are based upon the reports of the several prefectures under the survey.

The incidence of rabies among the inoculated dogs is 0.033 per cent., and of stray dogs is undeterminable.

It is stated that the high numbers of rabid dogs during the years 1924 and 1925 were due to the fact that on account of the earthquake in September 1923 the inoculations were not effectively carried out. The authors consider that "complete prevention of rabies lies in prophylactic inoculations of dogs which are the source of infection." Such measures must be generally applied, as adverse conditions prevailing in any one prefecture may profoundly influence its neighbours.

³⁴ UMENO (Shinkichi) & UMENO (Sanae). Results of the Rabies Preventive Inoculations on Dogs in Japan.—*Kitasato Arch. Experim. Med.* 1931. May. Vol. 8. No. 2. pp. 174-188.

AUJESZKY³⁵ reports that antirabic inoculation of dogs has been compulsory in Hungary since 1929. Of 5,344 dogs inoculated at Budapest, 29 have been killed or died of intercurrent disease. Of the remaining 5,315, one has died of rabies in spite of the vaccination. No case of rabies has resulted from the treatment. One case of post-vaccinal paralysis of a temporary nature was observed.

vii. *Miscellaneous.*

As cases of typhus fever, showing marked bulbar symptoms early in the disease, may simulate rabies and cause errors in clinical diagnosis, STUART and KRIKORIAN,³⁶ at the instance of the Colonial Medical Research Committee, have carried out an investigation on the serological relationship between the two diseases, and in particular have subjected the sera of rabies subjects to the Weil-Felix reaction. The results which they have obtained from laboratory investigations made into typhus and rabies infections in man and in experimental animals prove a complete absence of serological relationship between the two diseases. In no case did the serum of the typhus subject exhibit any rabicidal property. On the other hand, the sera of four hydrophobia cases, two treated and two untreated, possessed no significant X 19 agglutinins, and the sera of 30 guineapigs and 30 rabbits which had been infected with rabies did not agglutinate X 19 strains even in 1 in 10 dilution.

In a short note PLANTUREUX³⁷ states that five dogs vaccinated against rabies, 3 before and 2 after splenectomy, have all exhibited a strong immunity. The presence of the spleen does not therefore appear to be necessary for the establishment or the conservation of antirabic immunity.

From a series of experiments on 42 dogs and a number of rabbits REMLINGER and BAILLY³⁸ conclude that there is no truth in the proverb that the badly nourished dog is sheltered from rabies—"le chien mal nourri est a l'abri de la rage." The behaviour of the virus in cachectic animals is identical with that observed in animals in perfect health.

From a further series of experiments these authors³⁹ conclude that anaesthesia by chloroform or ether (4 administrations, each of 30 minutes duration) is without influence on the incubation period of rabies.

In an article entitled "Studies on Rabies" REMLINGER and BAILLY⁴⁰ have collected a number of papers from the *C. R. Soc. Biol.*

³⁵ AUJESZKY (A.). Vaccination antirabique des animaux domestiques en 1929.—*Allatorvosi Capok.* 1931. No. 6. p. 67. [Summarized in *Bull. Inst. Pasteur.* 1932. Feb. 29. Vol. 30. No. 4. p. 220.]

³⁶ STUART (G.) & KRIKORIAN (K. S.). Rabies v. Typhus.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 353-366. [22 refs.]

³⁷ PLANTUREUX (E.). Immunité antirabique et splénectomie.—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. p. 632.

³⁸ REMLINGER (P.) & BAILLY (J.). L'état d'entretien d'un animal est sans influence sur la pathogénie de la rage.—*C. R. Soc. Biol.* 1932. Apr. 15. Vol. 109. No. 12. pp. 1074-1076.

³⁹ REMLINGER (P.) & BAILLY (J.). Rage et anesthésie.—*C. R. Soc. Biol.* 1932. Apr. 29. Vol. 109. No. 14. pp. 1241-1242.

⁴⁰ REMLINGER (P.) & BAILLY (J.). Etudes sur la rage. (Premier mémoire).—*Ann. Inst. Pasteur.* 1931. Dec. Vol. 47. No. 6. pp. 608-659. [Refs. in footnotes.]

which have already been reviewed, viz.: (1) Presence of virus in the spleen, liver and kidney (this *Bulletin*, Vol. 28, p. 742); (2) Existence of avirulent regions in the central nervous system (Vol. 28, p. 744); (3) Plurality of fixed virus strains. All are not inoffensive to man (Vol. 29, p. 190); (4) The toad and the frog are refractory to rabies (Vol. 28, p. 254); (5) Passage of fixed virus into the central nervous system of vaccinated animals (Vol. 28, p. 745); (6) Does normal brain substance sensitize rabbits to the virus of rabies? and dilution methods of treatment (Vol. 29, p. 192); (7) The identity of Mal de Caderas with rabies (Vol. 29, p. 189); (8) The repetition of pasteurian treatment does not induce anaphylaxis (Vol. 28, p. 747).

A. G. McKendrick.

PLANTUREUX (E). Sur le traitement des herbivores après morsure par le vaccin antirabique formolé.—*Arch Inst Pasteur d'Algérie* 1931 Sept. Vol. 9. No. 3 pp 490-493. [Reviewed in this *Bulletin*, Vol. 29, p 195]

BERIBERI AND EPIDEMIC DROPSY.

BERNARD (P. Noel). *Recherches sur le bérubéri.* [**Research on Beriberi.**].—*Ann. Inst. Pasteur.* 1931. Nov. Vol. 47. No. 5. pp. 508–578. With 11 text figs. & 4 figs. (2 coloured) on 2 plates. [Refs. in footnotes.]

The first part of this very long and elaborate paper contains an historical account of the various theories concerning beriberi etiology. The second section presents the thesis that the disease shows all the manifestations characteristic of a toxi-infection. It is important to realize that beriberi in Indo-China appears both in isolated sporadic cases and in true epidemics; also that the disease should rationally be divided into the types—acute, subacute, chronic and *formes frustes*. During epidemics (for example, that described in Tanan, Cochinchina, 1927–1928) certain interesting features were noted, such as the contagious nature of the disease; the liability of all members of the community, and not only the very poor, to attack; all live in the open air and feed as they like; no children under 10 nor adults over 50 are affected; in 1928 out of 127 cases admitted to hospital 10 died suddenly from the acute pernicious form of the disease. It is argued that only such acute cases should be employed as material for etiological research since they are usually young, robust, well-nourished subjects and have no complicating picture of debilitating disease.

Considering the importance of such acute cases the following clinical description may be noted. The patient presents the appearance of an acute febrile illness with constipation, severe tachycardia, praecordial pain, diminished urine secretion and acute distress. Death may occur in a few hours; sometimes this is delayed for a day or two or even a week, and occasionally may occur later still during a relapse. If the patient recovers from the acute attack peripheral neuritis, with or without oedema, appears. Thus possibly months later the picture of beriberi too often regarded as typical is presented. Those observers who identify human beriberi with experimental B-avitaminosis have taken the more chronic forms as their type and consider the absence of fever and albuminuria to be essential. In the acute pernicious form of the disease, however, fever is present and the urine contains albumin and casts.

The third section of the paper deals with the relationship between human beriberi and experimental toxi-infection. The experimental animal of choice was the young pig and the infective agent *B. asthenogenes*. This organism is found in various foods, especially rice, and becomes pathogenic in the digestive tract and there produces a toxin which gives rise to a definite clinico-pathological picture. When the animals are given cultures of *B. asthenogenes* only a half of them, or less, contract the disease and the symptoms vary from a simple febrile gastritis with constipation, myalgia, asthenia and temporary pareses up to death in a few days or a polyneuritis syndrome. In human subjects suffering from a febrile gastro-enteritis the bacillus has been found in blood cultures and the condition of the patients has progressed to the state met with in experimentally infected pigs. It is important to note that blood cultures are only positive during the febrile stage, showing that the septicaemia is not permanent. In the pig, following ingestion of the organism or its filtered toxin the

post-mortem changes in the heart and other organs are identical with those found in human beriberi and it seems incontestable that these changes are of a toxic order.

Many other important points emerge from the experimental work on young pigs. (1) The experimental disease does not appear in animals fed with rice of which all the vitamins have been destroyed by heat unless the bacillus is also present. (2) The presence of vitamins is not sufficient to protect animals against the experimental disease but avitaminosis favours its development. (3) The experimental disease is transmitted from diseased to healthy animals by contact with infective faeces and urine. (4) Laboratory diagnosis is uncertain since the organism is present in the excreta of control animals and complement-fixation tests give varying results both in the animal and in man. (5) The first phase of the disease consists in fermentation of the stomach contents and the gastro-duodenitis of human beriberi is exactly comparable, both macro- and microscopically, with the changes found in the experimental animal.

There follows a detailed description of the bacillus and its toxin which is of too technical a character for discussion.

In conclusion the author stresses the following points: True beriberi is an acute disease and the usual type described is not true beriberi at all, but only a sequel of a previously contracted toxi-infection. It is not due to the invasion of a specific organism but the toxi-infective phenomena of the disease develop on a soil already prepared by a badly balanced diet in which carbohydrates are in excess and other elements insufficient. Three factors, then, are necessary for the production of the disease—the toxin-producing organism, a gastro-intestinal condition favouring its action and a lowered resistance resulting from a faulty diet. If one of these factors is lacking, even though the other two are present, beriberi does not make its appearance.

[This is a very long and valuable paper and it is impossible in a short abstract to do it justice. Those interested will be amply repaid by reading the original.]

A. D. Bigland.

NGUYEN-VAN-KHAI. Contribution à l'étude clinique du béribéri en Cochinchine. [**Beriberi in Cochin-China.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1932. Jan. Vol. 10. No. 1. pp. 18-63.]

The author has an extensive and intimate knowledge of beriberi in Cochin-China and here records his clinical experience of more than twenty years. Only the more important findings need be discussed.

Beriberi is a toxi-infective disease having two definite stages (1) the invasion period characterized by fever, pain in the back and digestive disturbances. This lasts some days and is often overlooked. (2) The period of polyneuritis, with or without oedema, and cardiac symptoms of varying gravity. Since the toxin may affect either the motor, sensory, sympathetic or pneumogastric nerves or a selection of these, it follows that the clinical picture will be a very varied one.

The paralysis is of the flaccid type without sphincter involvement and later progressive wasting may manifest itself even to the extent of "main en griffe." Albuminuria is as a rule absent except in very grave cases. Constipation is frequently found. The knee jerks are first exaggerated and later disappear. Absent knee jerks may persist for a long time and in four cases this was found some 10 years after complete cure of the disease. Alterations in the voice are constant and dysphagia may be present in severe cases.

In addition to the classical types of beriberi two more varieties are described. (1) A chronic form. This is characterized by slow onset so that the patient does not come under observation for 2-3 months or even longer. As the disease progresses motor and sensory disturbances appear first in the legs, then in the arms. The heart is slightly or not at all affected, the knee jerks are always absent and the general health is satisfactory. Apparently the patient may remain in this condition for years. (2) A residual form in which certain nervous symptoms persist after cure of the active disease.

Another type of the disease is known as post-partum beriberi. This generally appears 1 week to 2 months after parturition and in some women follows each successive birth. Infantile beriberi occurs only in babies who are suckled by mothers suffering from the disease.

In the section dealing with diagnosis mention is made of the inability of beriberi patients to raise the thighs and legs in a straight line when lying on their backs and to sit up without the aid of the arms. Complement deviation tests with *B. asthenogenes*, chloride retention and hypoglycaemia may be of diagnostic assistance.

Beriberi is apparently on the increase in Cochin-China but accurate statistics are difficult to obtain. At one prison in 1924 there was a morbidity of 32 per cent. with a mortality of 18 per cent., and in another epidemic occurring in a certain plantation a morbidity of 36 per cent. was recorded and one-third of those attacked died.

A. D. B.

PLACIDI (Th.). Note au sujet du "béribéri." [**Note on Beriberi.**]—*Rev. Méd. et Hyg. Trop.* 1932. Mar.-Apr. Vol. 24. No. 2. pp. 67-69.

Two epidemics seen in the New Hebrides are briefly described. On one plantation where Kanakas and Annamites lived side by side without beriberi the disease appeared soon after the arrival from Indo-China of a convoy of labourers, three cases among the Annamites and four amongst the Kanakas.

On another plantation were villages of 250 newly-arrived Chinese and 95 Annamites, for reasons of discipline kept strictly apart. Beriberi (65 cases) appeared among the Chinese, interrelation was perforce recognized and soon after four cases were found among the Annamites who had been free from beriberi for several years.

The author finds it difficult to attribute these outbreaks to avitaminosis. He gives the ration and says it was supplemented from the gardens. The use of decorticated rice is general in the Archipelago and the same rice was eaten in these as in neighbouring plantations. He would attribute the outbreaks to infection and thinks the disease was introduced in each case from Asia. Few details are given.

A. G. B.

ALBERT (José). **Studies on Infantile Beriberi based on Five Hundred Fourteen Cases.**—*Philippine J. Sci.* 1931. June. Vol. 45. No. 2. pp. 297-319. With 1 text fig. [32 refs.]

Infantile beriberi, the disease which affects babies suckled by mothers who are themselves sufferers, is a terrible scourge in the Philippines, claiming an average of 16,500 deaths annually (28.10 per cent. of the total deaths among infants under one year of age).

The disease must not be regarded as adult beriberi in miniature for it differs "in almost every particular; pathological, clinical and therapeutical." The chief symptoms are obstinate vomiting, incessant crying, dyspnoea, oedema, aphonia, lessened urine secretion and tachycardia. Multiple peripheral neuritis does not occur. Among the etiological factors the following may be noted:—The disease occurs most often during the rainy season; it is never observed in Caucasians and only rarely in white half-breeds; the most dangerous age period is 1–3 months; both sexes are about equally affected; it is strikingly a disease of poverty and apparently does not occur in infants who were never breast fed. In the few cases recorded of the disease in artificially fed infants breast feeding at some period was usually found.

In analysing the causal relationship between infantile beriberi and mothers' milk the following points are of interest: (1) The severity of the disease in the child is not directly proportional to the severity of the disease in the mother. (2) Children of mothers presenting no objective or subjective symptoms of the disease are affected. About 25 per cent. of cases belong to this group. The onset of the disease in the child may precede that in the mother. (3) Infantile beriberi is independent of the duration of breast feeding. In one of the author's cases a baby had only been on the breast one week before the institution of artificial feeding.

As a result of GUERRERO'S work (1904) and the therapeutic discovery of CHAMBERLAIN and VEDDER (1912) "this implacable and wanton enemy of breast-fed babies is now wane-ward bound." In 1906 the infant mortality rate for the City of Manila was 476·17, whereas in 1930 it was only 160·24; "this diminution is due mainly to the reduction in the mortality from infantile beriberi, which, without the least shadow of doubt, has been successfully fought by tikitiki."

A. D. B.

BRENNAN (T. J.). **The Early Diagnosis of Beriberi.**—*Jl. Philippine Islands Med. Assoc.* 1931. Dec. Vol. 11. No. 12. pp. 482–483.

The author maintains that incipient beriberi is inadequately described in the text books. There are, he says, five subjective symptoms, found in over 90 per cent. of these cases: "(1) Upper chest pain, either back or front or both; (2) Insomnia; (3) Palpitation; (4) Pain or numbness of legs; (5) Fatigue after slight exertion."

Such persons do not consider themselves sick. Physical examination shows only slight muscular weakness and tenderness, some anaesthesia over the shins, tachycardia and increased or decreased knee jerk. If rice is omitted from the diet and a teaspoonful of tikitiki is given three times a day, the symptoms will disappear in 7–10 days.

A. G. B.

VAN VEEN (A. G.). **Concerning Anti-Beri-Beri Vitamin Preparations.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1931. Vol. 20. Pt. 2. pp. 73–79.

The following is an account of the changes in composition and application found necessary in the various anti-beriberi vitamin preparations issued by the medical laboratory at Weltevreden.

Vitamin tablets and powder.—According to JANSEN and DONATH 4 tablets (1 gram of the powder) correspond to 30 grams of rice bran, which is about the daily quantity of anti-neuritic vitamin needed by an adult (0.5 mgm. of vitamin). During the last two years repeated tests on birds showed that in about one-third of the samples a lowering of the vitamin content occurred so that 6 tablets, or 1.5 gm. of powder, had to be given for a daily dose. Owing to the low selling price of the preparations this defect is likely to continue. The poor disintegrating power of the tablets, which was troublesome at first, has been overcome by the simple addition of a little starch.

The activated clay contains in addition to vitamin, a large amount of organic substances adsorbed from rice bran. The majority of these cannot be removed by chemical means but it seems probable that the alimentary tract is able to perform this separation.

Extract of activated clay.—0.2 cc. of this extract is equivalent to 4 tablets, or 0.5 mgm., of vitamin. Here again many other organic substances are present and the slightly acid extract is an excellent feeding ground for moulds and bacteria. Alcohol has been found to be a better preservative than either toluene or glycerol.

Ampoules.—Originally each of these contained 2 cc. of liquid in which 1 mgm. of anti-neuritic vitamin and 3 mgm. of other substances were dissolved. It was found that toxic effects of a serious nature sometimes followed injection and that the vitamin content of each ampoule was apt to be only one-half of that specified. Successful attempts have been made to remove the toxic substances and it is hoped soon to perfect a method of increasing the vitamin content. As acute beriberi is rare in the Dutch East Indies hypodermic medication is not of great importance.

In conclusion the author records his experience with other anti-beriberi vitamin preparations.

Metatone (Parke, Davis and Co.).—The dose is stated to be 1-2 teaspoonsful, but even 25 cc. given with the food did not protect birds against polynuritis.

Oryzanin tablets.—The prescribed dose is 12 tablets per diem but 15 were found necessary to protect test birds.

Oryzanin extract.—Prescribed human dose is 9 gm. per diem, but not less than 15 gm. was found adequate for birds.

Liquid Oryzanin.—A daily dose of 20 cc. added to the birds' food was sufficient protection.

Oryzanin Ampoules.—According to a previous report 4 of these ampoules was sufficient but in another series a dose of 3 ampoules was ineffective and a mouse injected intravenously with $\frac{1}{3}$ cc. died immediately.

Eviumis. (Obtained from Prof. WENCKEBACH).—A dose of 4 gm. per diem of this powder was found adequate in bird tests. A. D. B.

TOURNIER. Les éléments de la thérapeutique du bérubéri. [*The Treatment of Beriberi.*]—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.-Nov.-Dec. Vol. 29 No. 4. pp. 861-871. [27 refs.]

This very full account of various therapeutic measures employed in beriberi may be summarized as follows:—

Antitoxic Treatment.—This consists of (1) the exclusion of rice or other decorticated cereal from the diet. (2) Giving a fresh milk diet to acute cases and a lacto-vegetarian diet to sub-acute and chronic

cases. (3) Elimination of toxins by blood letting (at least 300 cc. at a time) with or without blood transfusion; by exhibition of saline purgatives (especially magnesium sulphate), diuretics and calcium salts (especially the gluconate). (4) Correcting acidosis by small doses of insulin, in conjunction with intravenous injections of glucose. Insulin is contra-indicated in under-nourished subjects. Other remedies to be tried under this heading are sodium bicarbonate, glucose, and organic extracts, such as adrenaline, thyroid and liver.

Anti-Infection Treatment.—(1) By the use of general antiseptics such as iodine, colloidal metals and arsenic. (2) Gastro-intestinal antiseptics—urotropine, sodium benzoate and sodium salicylate. These are especially recommended by those who regard the starting point of beriberi as a specific infective gastro-duodenitis. (3) Anti-parasitic medication (e.g. quinine and anthelmintics), since infections like malaria and ankylostomiasis seem to favour the development of beriberi. (4) Saline purgatives.

Symptomatic Treatment.—(1) *Cardiac tonics.*—The author, contrary to some workers' experiences, has not seen any good result follow the use of digitaline and ouabaine in acute cases. Caffein, camphor in oil and spartein are preferred. (2) *Diuretics.*—Digitalis, caffein and glucose have already been discussed. Theobromine was found to be without action in acute cases. According to WINCKEBACH and AALSMEER, novasurol, salyrgan and neptal are also of no value. Calcium chloride appears to be indicated especially when oedema and albuminuria are present, and possibly to increase the effect of the mercurial diuretics. Glucose and lactose solutions are useful when hypoglycaemia and under-nourishment are present. (3) *Nervous system tonics.*—These are particularly useful in the "dry" form of beriberi. Strychnine holds first place but should not be used in acute cases. Such drugs as kola, quinine, arsenic and iron, though used extensively in Indochina, have not given appreciable results. Electrical treatment may be of value in some cases. (4) *Opothrapy.* In this category adrenaline, particularly in acute cases, is the most important. Thyroid extract in small doses (sometimes combined with hypodermic injections of a 5 per cent. oily solution of cholesterine) has been recommended but in Indochina it was found to have no effect in altering the evolution of the disease though the general condition of the patient was improved. Pituitary, gastric, intestinal and liver extracts (especially the last) are useful adjuvants to other forms of treatment. (5) *Vago-Sympathetic Treatment.*—Atropine and ephedrine are useful drugs during the acute stage of beriberi. (6) *Vitamins and Amino Acids.*—For those who regard beriberi as a deficiency disease a protein-rich diet and vitamin B preparations are essential.

A. D. B.

AALSMEER (W. C.). Enkele waarnemingen bij de behandeling van lijders aan beri-beri. [**Some Observations in the Treatment of Beriberi.**]*—Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Feb. 15. Vol. 72. No. 4. pp. 206-212.

The various symptoms of beriberi reach their height during different stages of the disease. The author, whose views on this subject have been previously referred to (see this *Bulletin*, Vol. 28, p. 460), attaches most value to the condition of the circulatory apparatus, and especially to the minimal blood pressure. He found adrenalin exerts a dilating

influence on the vessels in beriberi, thereby lowering the minimal blood pressure for a while. By means of this test a number of patients were studied under various courses of treatment, and the therapeutic action of single measures thus estimated. Rest may have a beneficial influence but does not cure the condition so long as no extra vitamins are administered. Unpolished rice and katjang idjau are both useful in this respect. The same effect is obtained by injections of purified antineuritic vitamin (JANSEN & DONATH). Failure of the usual treatment may sometimes be ascribed to unsatisfactory absorption of vitamins from the intestine or to disturbance of their assimilation. The author thinks that his experiments lend valuable support to the deficiency theory of beriberi.

W. J. Bais.

AYKROYD (W. R.). **The Effect of Parboiling and Milling on the Antineuritic Vitamin (B_1) and Phosphate Content of Rice.**—*Jl. Hygiene*. 1932. Apr. Vol. 32. No. 2. pp. 184–192. [Summary appears also in *Bulletin of Hygiene*.]

The parboiling of rice is usually carried out by soaking unhusked grains in water for 24–36 hours, steaming them for 15–20 minutes and finally drying them in the sun; the husk can then be separated from the grain with comparative ease. It has been observed that beriberi does not occur in people who habitually eat parboiled rice and the explanation has been advanced that parboiled rice contains more vitamin B_1 than polished rice because less of the husk is removed. Experiments were carried out with young rats to determine the respective vitamin B_1 contents of different samples of the same rice (a) milled raw, (b) milled to exactly the same extent after parboiling. Much larger amounts of vitamin B_1 were found in the milled parboiled rice than in the milled raw samples. On the other hand the millings from the raw rice contained more vitamin B_1 than the millings from parboiled rice. It appears that during the process of parboiling vitamin B_1 is washed into the endosperm from the pericarp. Similarly larger amounts of phosphate were found in milled parboiled grains than in milled raw grains, but less phosphate in the millings from the parboiled rice than in those from raw rice. The phosphate content of raw rice is usually a good index of its vitamin B_1 content, but parboiled rice may have a comparatively low phosphate content and a high vitamin B_1 content.

S. J. Cowell.

OHMORI (Kenta), OKAMOTO (Hisata), HARA (Minoru), NAKAMURA (Soji) & KUROKAWA (Kiyoyuki). Studien über das sogenannte Oryzatoxin als Ursache der Beriberi-Krankheit. [**Oryzatoxin as the Cause of Beriberi.**]—*Kitasato Arch. Experim. Med.* 1931. Oct. Vol. 8. No. 4. pp. 315–340. With 4 figs. on 1 plate. [14 refs.]

Some workers have found that alcoholic extract of polished rice when fed to birds and mice caused hardly any symptoms, but when injected weakness and death soon followed. Others, however, repeating these experiments with rabbits found that in the preliminary test the animals died soon after injection but in the test proper no untoward symptoms occurred. Similar tests with fowls showed temporary paralysis only after repeated injections, though the animals lost weight and died. This resulting paralysis was not cured by injection

of oryzanin. It seems, therefore, that a poisonous substance may exist in alcoholic extracts of polished rice which only becomes evident when administered subcutaneously.

In order to prove or disprove the presence of this so-called oryzatoxin the authors of the present paper also conducted experiments, using a cold alcoholic extract of polished rice and feeding fowls upon the residual rice flour. The following are amongst the results:—(1) Animals fed upon extracted and non-extracted rice showed exactly similar clinical and pathological findings. (2) Adding oryzanin or ebios to the previously extracted rice kept the animals well and healthy. (3) When animals living on polished rice are fed or injected with alcoholic extract of rice symptoms of paralysis occur but oddly enough later than in animals not so treated, and in each case when the disease does occur it is identical. (4) In animals compulsorily fed upon polished rice there was no difference in the incubation period of injected and non-injected specimens. (5) In a few cases, however, slight paralysis followed a single injection of oryzatoxin. But in no case was any paralysis noted when an adequate supply of vitamin B was present in the diet.

The authors conclude that a toxic substance probably does exist in cold alcoholic extracts of polished rice but the experimental results vary and, therefore, no definite conclusions can be drawn. A. D. B.

SHANKS (G.) & DE (M. N.). **The Pathology of Epidemic Dropsy.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 469-474. With 13 figs. (4 coloured) on 5 plates.

A considerable amount has been written during the past 20 years or more on the subject of epidemic dropsy, but almost entirely from the aetiological, epidemiological and clinical aspects, and with what appears to be a preconceived idea of its close connexion with wet beriberi. This conception is probably responsible to a large extent for burking enquiry and hindering research. More recently evidence has been accumulating in favour of the condition being a distinct morbid entity and this paper, describing almost for the first time the morbid anatomy and histology, will do much to stimulate research, which to be productive should be taken up *de novo*.

The authors describe the detailed findings of 4 fatal cases, all adults, 3 males of 40, 52 and 35 years, and 1 female of 31 years. The female and one male were Hindus, one an Anglo-Indian and one a Moham-medan. Unfortunately in two of the cases the necropsy was not held until the lapse of an interval (28 and 43 hours) after death which would render microscopical examination of tissues valueless in a tropical country. The gross changes were the anasarca in all, hydrothorax in three, ascites in two, hydropericardium in one and the fluid in this bloodstained; petechiae or dilated vessels recognizable by naked eye were present in all and multiple "angiomata" in one; the adrenals were "mushy" in one patient, not noticeably altered in the others. In each case the patient had been ill for about a month before coming to hospital and death occurred in less than 5 weeks from the onset in the first, in 5, 6, and between 7 and 8 weeks in the others.

The most striking lesion microscopically was dilatation of capillaries, most marked in parts where they were poorly supported, the fatty tissue of skin, pericardium, peritoneum, spinal meninges, etc. These

are shown in some excellent photographs, but better still in the coloured plate. The authors state that the "haemorrhagic-looking areas" were not due to extravasations of blood but to extreme vascular dilatation; nevertheless in some places these had ruptured.

[The indications are rather those of some general toxin acting upon endothelium and examination of further tissues in as fresh a state as possible may reveal small haemorrhages by diapedesis such as are found in conditions due to phytotoxins; the symptoms seem to be too drawn out for glucoside or saponin action, or poisons of the ricin, crotin, abrin group, but they might arise from the slower action and cumulative effect of a food *poison*, some fungus or plant (rather than a food *deficiency*) analogous to lathyrus on the central nervous system, and claviceps on the vessels, in other words a circulating toxin producing a purpuric condition—a symptomatic purpura, i.e., purpura of unelucidated aetiology. No emigration of leucocytes was seen, but diapedesis can occur without this. Patient No. 2 who presented widespread nodular lesions of an "angiomatous" character would have been the best subject for this examination, as the post-mortem was carried out only 6 hours after death, but in this case "unfortunately the material was not available for microscopical study." It would be well to avoid the term *angioma*, for this implies a more or less independent growth of vessels, often not communicating with the capillaries of adjacent tissue; it differs from mere dilatation such as is described in epidemic dropsy.] H. H. S.

BUCHANAN (J. C. R.). "**Chachaleh,**" a Common Disease in British Somaliland, and its Relation to Tropical Deficiency Diseases.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 383-397. [14 refs.]

In British Somaliland there occurs a somewhat ill-defined disease characterized by pain in the muscles, bones and joints; "burning feet" and other paraesthesiae; and varying degrees of oedema. This condition is called by the natives "Chachaleh" and "Barasheli."

The clinical features analysed from 100 cases, are as follows:—It is a very chronic condition and may last 10 years with only slight disability. It is seldom, if ever, fatal. Pain is usually generalized but may occur in various localities, particularly in the joints and at the back of the neck and shoulders. 82 per cent. of the patients showed oedema of varying degree, while there was thickening of the subcutaneous tissues (especially in the thighs, abdomen, pectoral and deltoid areas) in 41 per cent. The knee jerks tend to be diminished and the symptom "burning feet" was recorded in 39 cases. Epigastric pain was common and constipation the rule. In only 15 cases was myocardial weakness present and then only in a minor degree. In 3 cases there was severe cardiac involvement. Some fever was present of a low intermittent type. The urine was normal.

Treatment, of sufficient duration to be of value, was carried out in 50 cases. (1) 22 patients received tincture of iodine in increasing doses of 10-25 minims in 4-8 cc. distilled water intravenously twice weekly. Of these 13 were improved and 6 cured. (2) 17 cases received 1 oz. of yeast t.d.s. together with one uncooked onion. Of these 8 were improved and 6 cured. (3) A combination of the above treatment tried in 11 cases resulted in 6 being cured and 4 relieved. No alteration in the diet was advised and saline purgatives were given

as a routine procedure. It seems that the yeast and onion treatment was particularly effective in removing oedema and the iodine in dealing with pain and paraesthesiae.

In the section dealing with etiology, diets in Somaliland receive full consideration.

"These contain most of the essential elements but lack variety and balance; it is also doubtful if the vitamin content is always adequate, and their nature is such that it is questionable if foodstuffs ingested are fully absorbed and utilised by the body. In any case, the margin of safety is so small that a slight fall below the average will bring them within the danger zone of deficiency, and a fall will invariably affect animal protein and vitamins most, since hard times to a Somali mean that he consumes less milk and mutton than usual and supplements his diet with cheap rice."

The disease was found in all classes of natives, slightly more often in females, but those having a full and assured diet were relatively immune.

Chachaleh bears a resemblance to the ill-defined and "larval" types of beriberi, but its similarity to epidemic dropsy is so great that it is doubtful whether the two conditions can be separated. The symptom "burning feet" it will be remembered was common in the pellagra cases described by STANNUS [this *Bulletin*, Vol. 27, p. 766].
A. D. B.

AALSMEER (W. C.). Ueber den Einfluss des Adrenalins auf den diastolischen Blutdruck bei Aorteninsuffizienz und Morbus Basedowii in Analogie zur Beriberikrankheit.—*Klin. Woch.* 1932. Feb. 27. Vol. 11. No. 9. pp. 362-366.

HIZON (Rafael P.). Tiki-Tiki Extract in the Treatment of Adult Beriberi.—*Bull. San Juan de Dios Hosp. of Manila.* 1931. July. Vol. 5. No. 7. pp. 192-197. [14 refs.]

ROSEDALE (John Lewis) & OLIVEIRO (Christopher Joseph). Studies on the Antineuritic Vitamin. The Relationship of Beriberi to the B Vitamin Complex.—*Far Eastern Assoc. Trop. Med. Trans. Eighth Congress, Bangkok, 1930.* pp. 86-96. [12 refs.]

PELLAGRA.

FAKIRY (Asaad). **Incidence, Parasitological Findings and Treatment of Pellagra in Kafr-El-Zayat Ankylostoma Hospital, 1930.**—*Jl. Egyptian Med. Assoc.* 1932. Feb. Vol. 15. No. 2. pp. 53–64. With 3 graphs in text.

During 1930 at the Ankylostoma Hospital, Kafr-El-Zayat, pellagra occurred in 214 patients (1·22 per cent. of the total). The largest number of cases was found in April and the least in August. Males under 12 years were apparently particularly susceptible. Out of 175 pellagrins 162 (92·3 per cent.) showed by ordinary methods of examination ova of *Schistosoma haematobium* or *mansoni* or both; while the bilharziasis rate for the whole hospital was 68·6 per cent. In pellagra, intestinal bilharziasis was the commoner of the two infections and the incidence rate was nearly double the hospital average for all patients. It is suggested that such intestinal changes may cause either excessive destruction of proteins or their defective absorption and therefore may play a part in the causation of pellagra. A similarity between bilharziasis incidence in pellagrins and in cases showing only stomatitis tends to demonstrate that the latter may be a prodromal symptom of pellagra.

Satisfactory therapeutic results followed daily intravenous injections of 10 cc. of a 10 per cent. sodium thiosulphate solution. Children received only half this dose. It is suggested that the concentration of the thiosulphate solution should be increased to 33·3 per cent. so that the bulk of the injection may be reduced to 3 cc., thus facilitating routine treatment. On the assumption that stomatitis is an early symptom of pellagra such cases should also receive treatment.

[In the discussion which followed opinion seems to have been divided concerning the presence of stomatitis as an early symptom of pellagra.] A. D. Bigland.

KASSIRSKY (J.) & BUROVA (L.). Zur Klinik der Pellagra in Mittelasien. [**Pellagra in Tashkent.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. June. Vol. 36. No. 6. pp. 323–336.]

Forty-eight cases of pellagra were observed in the Clinic for Tropical and Internal Diseases, Tashkent (Russian Turkestan). The following points seem worthy of notice :—

(1) Bacteriological examinations of the mouth were made in 26 cases showing sore tongue. All showed the presence of Vincent's fusiform bacilli and spirochaetes in large numbers.

(2) In a few cases after prolonged diarrhoea invagination of the intestine occurred as evidenced clinically by the presence of a palpable tumour with visible peristalsis. This invagination never reduced itself owing to subsequent inflammatory changes.

(3) Chemical examinations of the blood revealed a lessened cholesterol content and an increase of the potassium and calcium contents in 97 per cent. of cases.

(4) A few cases presented a diabetes insipidus syndrome.

(5) No marked anaemia was present though puncture showed changes in the bone marrow.

(6) The total blood quantity in serious pellagra cases fell even as low as 5.0 per cent. of the body weight (normal figure is 6.7-7.0 per cent.).

(7) A rich protein diet together with the administration of calcium chloride quickly relieved the diarrhoea but the other symptoms remained as before and even progressed. Small doses of thyroid extract and a vitamin-rich diet proved fairly successful. Blood transfusion gave only temporary improvement.

(8) The mortality figure was 28 per cent. and in the following spring 30 per cent. of the improved cases returned with a relapse.

A. D. B.

KLEINMANN (H.). Beiträge zur Frage der Pellagra mit besonderer Berücksichtigung der Pellagra in Moldavien. [**Pellagra in Moldavia.**—*Arch. f. Dermat. u. Syph.* 1931. Nov. 19. Vol. 164. No. 2. pp. 393-398. [23 refs.]

In a hospital at Birsula, a town in Moldavia, 63 cases of pellagra were studied. The patients were collected from 28 different villages in the district; thus in 18 villages there was only one case in each, in 4 villages 2 cases and in 2 villages 5 cases. The greatest number of pellagrins in any one village was 13. This scattered distribution is rather remarkable in view of the fact that pellagra is very prevalent in the neighbouring area of Southern Ukraine.

All the patients were land workers and came from the very poorest class of the community. Apparently maize is a staple article of diet and it is sometimes mixed with wheat or barley flour. The remainder of the diet is made up of pickle soup, onions, pickled cucumbers and potatoes. Meat and milk are only occasionally consumed and alcohol never. Females are attacked in the proportion of 46:17 males. Nearly all the males were over 40 years of age, whereas in females every age period was equally liable to the disease. Members of the same family were rarely attacked except for two instances in which mother and daughter were victims, two instances in which two sisters were victims and in one family the father and two grown-up sons were found to be sufferers. The earliest cases (2) dated from 1920, in 1929 there were 17 cases; in 1930, 31 cases and in 1931, 5 cases.

In addition to the usual symptoms, hyperkeratosis of the nose-lip area was noted in 14 cases and in 20 cases there was the unusual feature of falling out of the outer part of the eyebrows. Vulvitis was common, and in 34 gastric examinations achlorhydria was present in 33.

The author considers that pellagra is not a vitamin deficiency disease but rather the expression of an endocrine-sympathetic disturbance resulting from the action of a toxic substance. He is of the opinion that the facial hyperkeratosis, the blood changes, the achlorhydria and the falling out of the eyebrows are symptoms of great differential diagnostic importance.

A. D. B.

SPIES (Tom Douglas). **Pellagra and Vitamin Deficiency.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Oct. Vol. 29. No. 1. pp. 83-86. With 2 text figs.

The author points out that in so many dietary experiments dealing with pellagra etiology adequate controls have not been used. To

remedy this defect four acute pellagrins (3 white males and 1 negress) were studied while receiving a 2,300 calorie diet consisting of: "corn meal mush, corn meal muffins, pork fat, maple syrup, polished rice (boiled), cornstarch pudding, coffee and sugar." It will be seen that this regimen is more restricted in mineral content and in vitamin C and B than was the classical pellagra-producing diet of GOLDBERGER. Striking and almost immediate improvement in all four cases was noted and there was no return of signs or symptoms during the 6-7 weeks' stay in hospital on this diet.

The three male patients had a history of alcoholism, while all presented on admission typical pellagra appearances and gave a history of dietary deficiency extending over two months or more.

[In view of the alcoholic history of the three male cases it can be argued that the stay in hospital with its consequent abstinence played an important part in their remarkable recovery.] A. D. B.

KAHN (Bernard L.). **Pellagra and its Treatment. With Report of 22 Cases.**—*Med. Times & Long Island Med. J.* 1931. Oct. Vol. 59. No. 10. pp. 362-363, 373-374. [12 refs.]

Twenty-two cases of pellagra admitted to the Philadelphia General Hospital are here reported. The author is of the opinion that the disease is on the increase owing to the privations consequent upon unemployment. Alcohol, too, is a causative factor in many cases. Reference to the literature shows that the disease is very rare among Jews. None of this nationality was found in the present series and it is claimed that "the well-known immunity of the Jewish people to pellagra has been built up by centuries of training in proper dietetics."

Treatment (successful in all cases except those with severe alimentary and nervous disturbances or other associated diseases) consisted of (1) Diet composed chiefly of milk, meat, green vegetables and eggs. (2) Brewers' yeast—2 teaspoonfuls in a cup of tomato juice, t.d.s. (3) Dilute hydrochloric acid, 10 minims t.d.s. A. D. B.

FRALIC (H. B.). **Pellagra ; Report of Six Cases.**—*Med. Bull. Veterans' Administration.* 1932. Jan. Vol. 8. No. 1. pp. 56-60. [5 refs.]

Six cases of pellagra admitted to hospital in Minneapolis are described in detail. Apparently the disease is rare in this locality.

All the patients gave a history of deficient diet and those still living improved when given milk, eggs, fresh meat and vegetables together with yeast and arsenic. The author regards pellagra as an avitaminosis though in the State of Minnesota it has to be reported as a communicable disease. A. D. B.

MEYER (August). **Sporadische Pellagra in Mitteleuropa. [Sporadic Pellagra in Mid Europe.]**—*Klin. Woch.* 1932. Mar. 12. Vol. 11. No. 11. pp. 451-454. With 4 text figs. [7 refs.]

Three cases of pellagra at the University Clinic at Basle are described. All three cases were females, one having a long history of pyloric stenosis, and the other two being markedly alcoholic. The first case was relieved by radical cure of the gastric obstruction and one of the others by the exhibition of high protein diet, liver, yeast and hydrochloric acid. A. D. B.

WHEELER (G. A.). **The Pellagra-preventive Value of Canned Spinach, Canned Turnip Greens, Mature Onions, and Canned Green Beans.**—*Public Health Rep.* 1931. Nov. 6. Vol. 46. No. 45. pp. 2663–2668.

Canned turnip greens contain a satisfactory amount of pellagra-preventive vitamin and prove a practical and effective dietary supplement. Canned spinach is also useful in this respect but mature onions and canned green beans are poor sources of P-P factor. *A. D. B.*

LANGWORTHY (Orthello R.). **Lesions of the Central Nervous System Characteristic of Pellagra.**—*Brain.* 1931. Sept. Vol. 54. Pt. 3. pp. 291–302. With 7 figs. on 1 plate. [15 refs.]

Pellagra presents a variety of nervous system lesions affecting the brain, cord and peripheral ganglia everywhere. In most cases, however, one portion of the nervous system bears the brunt of the attack with consequent variations in clinical and pathological findings. A case described in detail in this paper may be summarized as follows :—

White woman, aged 22, presented typical skin, alimentary and neurological signs of pellagra. Apparently vomiting and diarrhoea had been present for 18 months. There was no definite history of diet insufficiency. At autopsy tuberculosis of the lungs and intestines was found and this may have accounted for faulty absorption of food from the alimentary tract. Histological changes in the nervous system were typical. These were very diffuse, involving all portions of the neurones. "Accumulations of pigment were found in cells of the sensory and autonomic ganglia and those in the spinal cord and brainstem. The antero-lateral columns of the cord were most severely involved; there was no abnormality in the posterior columns. The lesions involved particularly the spino-cerebellar and cortico-spinal tracts. It is probable that the neurological abnormalities were of only short duration; considerable fat could be demonstrated in the lateral columns of the cord. The small cells of the sensory ganglia showed the greatest deposit of pigment." The meninges of the cord and brain were somewhat thickened and there was an excess of Wilson's granules in the neurolemmal cells of nerve trunks. The heart was small and atrophied and the uterus was infantile.

A. D. B.

BALLIF (L.) & ORNSTEIN (I.). **La cholestérolémie dans la pellagre aiguë.** [**Cholesteraemia in Acute Pellagra.**]—*C. R. Soc. Biol.* 1932. Jan. 29. Vol. 109. No. 3. p. 234.

Investigations of the blood cholesterol content in pellagra were made in 22 acute cases (4 women and 18 men). In 57 per cent. a hypocholesterolaemia was found and in only one case was the figure for cholesterol in excess of normal limits. There was no albuminuria and no evidence of either chloride or nitrogen retention in the urine. In 4 cases a slight increase in the blood urea figure was found but there was no association between this and the cholesterol content.

A. D. B.

TSCHERKES (Henriette). **Chemische Blutbefunde bei Pellagra.** [**Chemical Blood Examination in Pellagra.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Feb. Vol. 36. No. 2. pp. 81–87. [18 refs.]

In July 1929 sixteen cases of pellagra were evacuated to Odessa from a district of the Ukraine where an epidemic of the disease (800

cases) had occurred. An opportunity was thus afforded of making certain routine chemical blood examinations. Previous to their evacuation the pellagrins had lived on an almost exclusively maize diet. On admission to hospital and during the two weeks in which the examinations were made the diet was mixed and sufficient, but still low in anti-pellagra factor.

Figures for blood sugar, non-protein nitrogen and potassium were found to be within normal limits, while the calcium content approached the highest level of normal fluctuations. There was also hypocholesterolaemia.

A. D. B.

GUTHRIE (J. Birney). **Achlorhydria in Pellagra.**—*Jl. Trop. Med. & Hyg.* 1932. Mar. 1. Vol. 35. No. 5. pp. 71-74. [14 refs.]

During 1921-1925 the author made 35 gastric analyses in 93 pellagrins in the Charity Hospital, New Orleans. The findings obtained were compared with those published by other workers. A second series of 161 examinations out of 243 pellagra cases in the coloured female side of the same hospital is here recorded. Of these 161 analyses 13.04 per cent. showed excessive or normal gastric hydrochloric acid content, 18 per cent. showed deficiency and 68.9 per cent. complete absence of acid. In a series published by TURNER in 1930, achlorhydria was found in 85.2 per cent. of pellagrins.

Other points of interest are (1) Histamin injections increased the gastric hydrochloric acid content in 27.5 per cent., decreased it in 12.5 per cent. and caused no change in 52.5 per cent.; (2) There was an average occurrence of diarrhoea in 58.1 per cent. of the achlorhydria cases and in 41.8 per cent. of cases in which acid was present in the stomach. These figures provide an obvious therapeutic indication; (3) The occurrence of hydrochloric acid in a case of pellagra gives a somewhat better prognosis, though achlorhydria is no absolute criterion of severity.

A. D. B.

SMITH (James H.). **The Influence of Solar Rays on Metabolism, with Special Reference to Sulphur and to Pellagra in Southern United States.**—*Arch. Intern. Med.* 1931. Nov. Vol. 48. No. 5. Pt. 2. pp. 907-1063. With 135 charts in text. [122 refs.]

The great length of this paper permits an abstract of the author's summary only.

Sulphur, in the form of the amino acid cystine, appears to protect low forms of life against solar radiation and the high concentration of this substance in the epidermal tissues of the higher animals is suggestive of a similar function. Cystine, in addition to its protective power against ultra-violet light, also promotes the growth of vitamin B and is connected with oxidative processes and with the detoxication of cyanogen compounds; all of which functions appear to be disturbed in pellagra. HOPKINS originally isolated glutathione (cystine combined with glutamic acid) from yeast, muscle and liver. Cystine is present in the anti-pellagra foods of GOLDBERGER and in amounts directly proportional to their preventive effect. There is some evidence, therefore, that lack of cystine may play a part in pellagra etiology.

Pigment is a protection against the superficial effects of solar rays. Now, pigmentation consists essentially in the deposit of melanin, a compound rich in sulphur. In this connexion it is interesting to note that the skin lesions of pellagra chiefly appear on exposed parts and

on parts which can phylogenetically be considered as such, e.g. the scrotum in man and the scrotum and tongue in dogs. That the effect of solar rays is not only superficial is suggested by the fact that pigmentation does not protect against pellagra as it does against sunburn; that pellagra shows a greater mortality in the white race; that "pellagra sine pellagra" is of doubtful existence in the view of many clinicians; and that sore tongue, diarrhoea and nervous changes are rare without associated dermatitis. It should also be remembered that an unhealthy organism is more susceptible to solar radiation than a normal one; thus "we may assume that normal tissue acts like a slow photographic plate and diseased tissue like a fast one."

Since the investigations of SULLIVAN and his co-workers (1919-1920) it has been recognized that sulphur metabolism in pellagra is faulty. Restoration of normal exogenous sulphur metabolism following an attack of the disease is not immediately accompanied by normal endogenous metabolism of this element. Excretion of thiocyanate in urine and saliva is decreased as also is that of urinary creatinine, though VOEGTLIN found in the urine an increase in neutral (unoxidized) sulphur. A loss of neutral sulphur in the cerebrum and spinal cord and an increase in the cerebellum have been recorded. Other workers have found that an adequate supply of cystine is necessary to maintain cyanide-detoxifying power in pellagra. Achlorhydria and absence of pepsin may adversely influence the splitting off of sulphur from the protein molecule.

To show the relative parts played by faulty diet and sunshine in pellagra three observations from the literature are quoted:—

"(1) Spontaneous pellagra and Goldberger's convicts, (2) spontaneous black tongue and Goldberger's dogs and (3) Enright's Germans and Bigland's Ottomans, prisoners of war in Egypt. In each of the three comparisons it would seem that when dietary deficiency is obvious and outstanding (the second instance in each group) in comparison with exposure to light, the effect partakes of a general or systemic reaction or type (. . . as opposed to a 'dermal' type in which the cutaneous lesions are relatively conspicuous), dermal effects readily attributable to direct exposure to light are at a minimum, scrotal lesions are relatively high, and mortality, when it can be compared, is great."

The age and sex incidence of pellagra run parallel to certain metabolic changes and there is a relationship between the geographical distribution of the disease and climate. In conclusion it may be stated that sulphur appears to protect the body against solar rays, that an inadequate supply of sulphur in the form of cystine plays an important part in pellagra causation, and that abnormal sulphur metabolism is a feature of the disease. A consideration of pellagra distribution and prevalence suggests that under certain abnormal conditions of nutrition solar rays may be an important factor in etiology

A. D. B.

WHEELER (G. A.). **A Note on the History of Pellagra in the United States.**—*Public Health Rep* 1931. Sept. 18. Vol. 46. No. 38. pp. 2223-2229.

As early as 1864, GRAY of New York and TYLER of Massachusetts each reported a case of pellagra. These are probably the earliest cases on record in the U.S.A. This long-standing history of the disease is in accordance with the author's findings during his epidemiological studies of pellagra (begun in 1916) in Spartanburg and the

neighbouring counties of South Carolina. A questionnaire was sent to all doctors in the district who had been in practice prior to 1903 asking whether they had seen cases of pellagra previous to its general recognition in the Southern States (1907-1908). 62 replies were received and 38 reported having seen one or more cases prior to this time, the earliest being in 1885.

During 1917 a house-to-house canvass in this area revealed a total of 1,147 cases of pellagra out of a population of 22,653 (an incidence of 50.6 per thousand). It is estimated that only 10-15 per cent. of these came to the attention of a physician. The principal argument, therefore, against the existence of pellagra to any considerable extent in the South prior to 1907 loses much of its weight; especially since the clinical descriptions of the disease at that time were very meagre and even misleading. The so-called diagnostic triad, diarrhoea, dermatitis and dementia, is now known to represent a severe or terminal picture of pellagra rather than essential symptoms of an ordinary case. Moreover, these symptoms must have been confused with other and, at the time, better known conditions, since following the recognition of pellagra the records of Southern States asylums show a compensatory decline in such other conditions.

It is not contended that pellagra was very prevalent in the Southern States prior to 1907 but it is a question how much the magnitude of the epidemic in that and following years depended upon economic conditions and how much upon increased clinical knowledge and pellagraphobia.

A. D. B.

ERULKAR (Abraham S.). A Case of Pellagra treated with Injections of Sodium Thiosulphate.—Reprinted from *Bombay Med. Jl.* 1932. Mar. 2 pp.

PANAYOTATOU (Angélique). Sur trois cas de pellagre. Une espèce de " Monilia " isolée des selles et du pharynx de ces trois cas.—*Rev. Méd. et Hyg. Trop.* 1932. Mar.-Apr. Vol. 24. No. 2. pp. 70-78. With 3 text figs.

RUTLEDGE (Winston U.) & KELLY (Robert). An Epithelioma secondary to Pellagrous Dermatitis.—*Arch. Dermat. & Syph.* 1931. June. Vol. 23. No. 6. pp. 1072-1075. With 2 text figs.

THATCHER (Harvey S.). Pellagra: Etiology (Modern Theories) and Pathologic Anatomy. [A Review.] *Arch. Pathology.* 1931. Dec. Vol. 12. No. 6. pp. 970-982. [95 refs.]

VEJARDE (A. Acosta). Pelagra.—*Bol. Asoc. Med. de Puerto Rico.* 1932. Apr. Vol. 24. No. 199. pp. 144-146.

SLEEPING SICKNESS.

SAUNDERS (G.). **Annual Report on Trypanosomiasis by the Pathologist at Yeji.**—*Gold Coast Rep. of Laboratory Services Year 1929-1930.* Appendix F. pp. 39-49.

During the year 34 cases of human trypanosomiasis were diagnosed. Of these 26 came for treatment, and the remainder were more or less unwilling victims caught during surveys of villages. Trypanosomes were found in all except one advanced case, who had previously had Bayer, and two advanced cases, who had increased cell counts in the cerebrospinal fluid. The methods of diagnosis were as follows:—

Examination of fresh blood	...	...	...	...	13
Gland juice	...	...	...	...	8
Centrifuged blood	...	...	...	...	2
Inoculation of blood into animals	...	...	...	...	7
Inoculation of C.S.F. into animals	...	...	...	...	1
Cell count C.S.F.	...	...	...	...	2
Clinical condition	...	...	...	...	1
					—
					34
					—

Great difficulty was found in demonstrating trypanosomes in some of the cases. If fresh blood examination was found to be negative once, subsequent examination never revealed trypanosomes unless there was a febrile relapse. In general the same applies to gland puncture. Efforts to establish strains in rats by inoculation of blood with abundant trypanosomes failed. It was found, however, that monkeys would take a human strain, and that dogs would take it if they were afterwards given an intraperitoneal injection of olive oil, as suggested by KLIGLER and WEITZMAN. Comparative direct inoculations showed that kittens or monkeys were better than dogs, and that dogs were better than rats. A number of details are given showing the use of olive oil injections for the isolation and maintenance of human strains in laboratory animals.

Details are given regarding the distribution of the disease in the Gold Coast. The report also contains a number of observations on treatment by an intensive course of atoxyl, and also some observations on the adhesion phenomenon, but these have been published elsewhere and noticed in this *Bulletin*. W. Yorke.

SAUNDERS (G.). **Annual Report on Trypanosomiasis by the Pathologist at Yeji.**—*Gold Coast Rep. of Laboratory Services Year 1930-31.* Appendix A. pp. 8-16. With 3 charts & 1 map.

During the year numbers of cases of clinical sleeping sickness, and of enlarged glands, came to Ejura for examination, but only a comparatively small proportion proved microscopically to be positive. The cases dealt with during the year are classified as follows:—

Remaining from last year	...	...	...	...	9
New infections	...	...	...	...	90
					—
Total	...	...	...	...	99
Sleeping sickness not proved microscopically	...	...	...	...	74
Enlarged glands not proved to be trypanosomiasis	...	...	...	...	208

The routine treatment adopted was similar to that used by MACLEAN in Rhodesian sleeping sickness, viz., five injections of 1 gm. each of Bayer 205 in three weeks, followed, with or without a month's interval, by a course of tryparsamide. When mental symptoms were well-marked tryparsamide was given first. In general, it might be said that this line of treatment almost always cures, except in patients who were moribund or had other debilitating diseases, or had been starved. Details of the results obtained are given in tables.

A few fairly advanced cases were treated with a new preparation "Hoechst 4,002," but the results were not very encouraging. The areas from which they came are indicated in a map. This probably bears some relation to the actual incidence of the disease, but there are complicating economic and psychological factors which obscure it to some extent.

A number of observations were made on the adhesion phenomenon, from which the author reached the following conclusions :—

"1. A positive adhesion phenomenon gives a strong presumption that the subject has had trypanosomes in his body.

"2. No relationship has yet been noted between the strength of the adhesion test and either prognosis or history.

"3. A strain of trypanosomes may lose its power of reacting in the test."

W. Y.

SAUNDERS (G. F. T.) & MORRIS (K. R. S.). **The Distribution of Human Trypanosomiasis.**—*West African Med. J.* 1932. Jan. Vol. 5. No. 3. pp. 39–45. With 1 map & 4 figs. on 1 plate.

The following summary is given :—

"1. Investigation into the amount of human trypanosomiasis was carried out in Eastern Ashanti and the Eastern Gonja district of the Gold Coast. At first a few compulsory surveys of villages were made, but later cases came in voluntarily. This latter method was found to be vastly superior to compulsory surveys in that it maintains the friendship and co-operation of the people.

"2. Search for trypanosomes in suspected cases was made by examination of blood and gland juice, and if this failed, by centrifugalisation and animal inoculation. The number diagnosed by the first method formed only sixty per cent. of the total cases found.

"3. The area of operations falls naturally into two types of country :—the orchard bush savannah which prevails in the North, and is replaced in the neighbourhood of Ejura by the rain forest of Ashanti extending southward.

"4. In the savannah country *G. palpalis* and *G. tachinoides* are the predominant species of tsetse, and are confined strictly to the vicinity of rivers and streams.

"In the forest region *G. palpalis* and *G. longipalpis* occur, but with a far wider and more uniform distribution.

"5. In the savannah the majority of infection occurred along the line of the river, where there are most flies, and along the line of the main road, where there are most people, with a maximum of infection where these intersect.

"In the forest the distribution of cases showed no relation to either rivers or main roads.

"6. More infection was found in permanent than in temporary fishing villages on the Volta although the latter are far more heavily fly-infested. This can be explained by the annual evacuation of these camps breaking the vicious circle of man-fly-man infection.

" 7. Comparison of this with previous surveys of trypanosomiasis in the Gold Coast seems to indicate an increase ; but the method of approaching the people and the careful technique in diagnosis would account for the larger number of cases found.

" 8. The distribution of cases shown by the map looks like an introduction of the disease. However the correlation of the disease with concentrations of human and tsetse might equally well explain this distribution.

" 9. A formula is suggested for correlating man, fly and trypanosome. As a first approximation.

$$K t = f P \dots \dots \dots (1)$$

is given ; K being a constant, t is number of cases, P is the population, and f the fly density-activity.

" This should apply to small villages, but in large towns the fly-man contact depends roughly on the circumference of the town, and, for an average of v villages, the formula becomes

$$K t = f \sqrt{Pv} \dots \dots \dots (2)$$

" 10. Difficulties in applying the formula lie mainly in the estimation of f. There is some uncertainty as to which species of tsetse are significant carriers here.

" Within our experience sleeping sickness never occurs away from *G. palpalis* ; but *G. longipalpis* has been found infected with *T. gambiense* ; *G. tachinoides* is a proved carrier elsewhere ; and *G. morsitans* and *G. submorsitans* are possible carriers.

" *G. palpalis* shows a preference for human and domestic animal food and is inclined to concentrate round village water holes, ferries and fords, which gives it increased opportunity as a vector.

" A fairly close correlation has been found between the density of *G. palpalis* and rainfall in savannah country. From this a table is given for the estimation of f for this species in this type of country.

" 11. For the estimation of t the simple proportion of cases diagnosed by blood and gland-juice to the total number found, which is as 2 to 3, must be taken, as a more precise mathematical correlation could not be found.

" 12. Two further factors complicating the use of the formula are occupational incidence of the disease and immunity. Fifty-three per cent. of the Yeji cases were occupational. Such discrepancies would at once be shown up by the formula.

" 13. Sleeping sickness is well known to the natives. Both Hausa and Ashanti names refer to some obvious symptoms, which may indicate a recent introduction of the disease.

" The Gonja name however has no reference to symptoms.

" 14. Human trypanosomiasis may have contributed in maintaining the paucity of population in the Mid Volta region of the Gold Coast, although it is probable that the original depopulation of these areas was brought about by Ashanti raids."

W. Y.

MORRIS (K. R. S.). *Trypanosomes of Game in the Gold Coast.*—*West African Med. Jl.* 1932. Apr. Vol. 5. No. 4. pp. 65-67.

During the work on tsetse control on the Eastern cattle route in the Northern Territories of the Gold Coast, the author took the occasion of studying the trypanosomal infection of game, and the effect of the proximity of the cattle route on this infection. The majority of the animals examined were shot in the Gambaga district. *G. submorsitans* was found in very small numbers in parts of this district, and none of the fly belts approached very close to the cattle route. *G. palpalis* and *G. tachinoides* were abundant along all the streams and rivers, and where these crossed the cattle route there was an intimate connexion between cattle, fly and game. The majority of these fly belts

were cleared by March, 1929, but at the heaviest fly belt, where game was particularly abundant, tsetse remained in the clearing in numbers up to September, 1929, the end of the rainy season. In the following dry season, and throughout 1930, there was practically complete exclusion of the fly from all the clearings.

The author considers separately the examinations of game made in 1929, when the cattle-fly-game connexion was only just broken, and examinations made in 1930, when there was a complete break in this connexion. The results of the examinations are given in a table.

The author summarizes his conclusions as follows :—

"The indications are that in this area *T. tragelaphi* is a normal parasite of game animals, probably tsetse-borne, and that the pathogenic trypanosomes occur in the game only when introduced by tsetse from cattle, and that failing this source of infection they will disappear.

"*Glossina tachinoides* is certainly a carrier of the latter trypanosomes, *G. palpalis* may also be involved, but *G. submorsitans* takes no part in transmission."
W. Y.

UGANDA PROTECTORATE. **Annual Report of the Human Trypanosomiasis Research Institute for the Year ended 31st December, 1931** [DUKE (H. Lyndhurst), Director].—11 mimeographed pp. 1931. Entebbe.

Duke commences his report with stating that 1931 has been "a year of disappointment, confusion, and retrenchment." He describes in detail the financial misfortunes which have overtaken his laboratory and their results. The Institute in its modified form will in future dispose of a revenue of £4,500 per annum and will come under the control of the Uganda Government. The staff has been considerably reduced. Curtailment of the original program, especially on the side of biochemistry, will be necessary; but the surviving unit is self-contained and well equipped, and it is confidently expected that it will be possible to carry out field work in addition to the maintenance of experiments at the laboratory. A summary is given of the work done during the year. This has already, for the most part, appeared in the form of publications which have already received notice in the *Bulletin*.
W. Y.

PARIS EGUÍLAZ (Higinio). Contribución al estudio de la epidemiología de la enfermedad del sueño en los territorios españoles del Golfo de Guinea. Trabajo dedicado al Comité Internacional de Higiene de la Sociedad de Naciones. [**Epidemiology of Sleeping Sickness in the Spanish Possessions in the Gulf of Guinea.**].—167 pp. With 7 folding maps. French summary at the close of each chapter. 1932. Madrid. [6 pesetas.]

In his preface the author states that in 1927 he was appointed a member of the Colonial Sanitary Service of the Spanish Territory in the Gulf of Guinea. Disagreement with the conduct of the Sanitary Service on matters relating to the campaign against sleeping sickness resulted in his leaving the Service in December, 1928. He records that in April 1928, he had felt it to be his duty to inform the President and Director of the Colonies of his views on the result of the sanitary campaign against sleeping sickness. He stated that the results in

Fernando Po would be minimal and after a short time the consequences for Continental Spanish Guinea would be disastrous. The author continued to live in the Colony collecting information during the years 1929 to 1931 and events have more than justified his pessimism of 1928. The present work summarizes the observations he made during the three years in question.

Chapter I contains an historical account of sleeping sickness in Spanish Territory in the Gulf of Guinea. The existence of the disease was recognized in Fernando Po in 1908, but cases were apparently rare and, as the subjects were mainly agricultural labourers, it was considered that the disease was imported from the continent. A Commission appointed in 1909 recorded the presence of sleeping sickness both in the Island and on the mainland. In the author's opinion the internment of German subjects from the Cameroons during the War exerted a profound influence on the spread of the disease. This is not surprising as about 15,000 persons, almost all natives from infected regions in the Cameroons, were disembarked at Fernando Po. Numerous cases of sleeping sickness were found amongst the interned and almost all had been infected before reaching the Island. In 1909 there were two foci of infection in Fernando Po, one at San Carlos and the other at Concepcion, but in 1919 the disease had spread all over the Island. Similarly, for much the same reason, the disease had, during the period, spread greatly in the continental Colony.

Chapter 2 discusses the state of affairs in Fernando Po disclosed by the inquiry of 1927. There seems to be no doubt that by this time the disease had acquired a great intensity; in Santa Isabel and its environments from 8 to 17 per cent. of the people were infected, in the coastal region from Santa Isabel to Concepcion 14 to 20 per cent. and at Baho over 50 per cent. In the western coastal region from San Carlos to Basakato approximately the same proportion was infected. *Glossina palpalis* had by this time spread over the entire coastal region.

In the next chapter the author deals with the efforts of the Sanitary Service to combat the disease. The only method of diagnosis employed was the examination of thick blood films. This method had the great disadvantage of not disclosing more than 50 per cent. of the positive cases, and consequently a great number escaped unrecognized from Fernando Po to the Colony of Spanish Guinea and to the neighbouring colonies. Also the monthly published records were fallacious in that they underestimated the true number of infected persons. During the years 1927 to 1929 the sleeping sickness patients were treated in hospital and at times more than 600 patients were there under treatment. As the mortality greatly increased owing to the poor hygienic conditions of the hospital the procedure was eventually abandoned and replaced by ambulatory treatment. The patients came to hospital for their injections and then returned home; but this method had the objection that the people spread the infection in their peregrinations. In view of the small size of the island and the facilities of communication, the author considers the treatment should be given in the villages and in the plantations, thus avoiding so far as possible the movement of the infected.

In Chapter 4 an account is given of the present state of affairs in Fernando Po. Sleeping sickness now extends over the entire coastal region. The mortality, although stated in the report of 1927 to be

slightly diminishing, is in reality stationary. *Glossina* in abundance infests the entire coastal region.

Chapter 5 deals with the distribution of the disease in Spanish Guinea. The proportion of infected varies greatly according to whether the natives have worked in Fernando Po or have never left the continent, and even among the latter it is much greater in those who have worked in the coastal region. Up to 1925 only certain portions of the coast were infected, but during recent years the disease has gradually spread over the entire colony. During the years 1928 to 1931 the average morbidity has increased by more than 33 per cent. and in certain places it has now actually reached 100 per cent. The mortality rate has likewise become much more serious and in certain places has reached disquieting proportions. *Glossina palpalis* is distributed in more or less great numbers over the entire colony.

The rapid spread of sleeping sickness is the cause of an extremely difficult situation in Fernando Po, the interests of which are exclusively agricultural. The recruiting of agricultural labourers from Liberia has been absolutely suspended since the beginning of 1930, and the frontiers of the continental colony and those of the Cameroons and of Gabun are closely watched to prevent the passage of natives into the Spanish Territory and their recruitment for work in Fernando Po. Consequently, the only source of labour for the Island is Spanish Guinea. Moreover, the chiefs and the general native population are so unfavourably impressed by the fact that the great proportion of those returning from the Island are infected with sleeping sickness that they are offering more and more resistance to further recruitment. In fact it is now only possible to obtain labour by methods of recruitment concerning which the author prefers to say nothing.

The report closes with a lengthy chapter on the methods whereby the author considers the situation could be successfully combated.

W. Y.

NAJERA (Luis). La trypanosomiasis humaine dans l'île de Fernando Póo. [S.S. in Fernando Po.]—*Medicina Paises Calidos*. Madrid. 1932. Jan. Vol. 5. No. 1. pp. 34-39.

The author draws attention to certain points which have been impressed upon him whilst responsible for 3,500 cases of sleeping sickness in the hospital at Fernando Po. On the question of diagnosis he believes that the simplest and most practical method is the examination of thick preparations of the peripheral blood. This method permits a diagnosis to be made in 70 per cent. of cases at the first examination, no matter what the clinical condition. The author, however, does not regard this percentage as sufficient. Gland puncture practised by skilled persons gives a higher proportion of successes, but this method was not found practicable in the hands of native assistants. In order to obviate the defects of the thick film method, examination was repeated 6 and 12 days later.

The author states that he has studied the cycle of the trypanosome in the peripheral blood during a period of four months, and that he has observed in untreated patients that the cycle is of two well-defined types. In the acute cases, the parasitic curve rises to a point where it remains for 5-15 days. This exacerbation is followed by a phase in which trypanosomes are not found; the duration of this negative phase is almost equal to that of the preceding exacerbation. In

chronic cases, or better in old cases, the trypanosome is frequently present in the blood but in small numbers (2 or 3 per thick drop preparation). In treated patients on the other hand the cycle is much more complex and varied. The author concludes from this that there does not exist a certain means of parasitological diagnosis, and that in doubtful cases the best procedure is the examination of thick blood preparations repeated at several days' interval.

Another important matter is the determination of the period of disease. For this the examination of the cerebrospinal fluid is necessary, but in the author's opinion it is better to rely on the globulin reaction than on the enumeration of the cells, because the former procedure is easier and simpler. In the three following tables the results are given of the examination of 300 patients in different stages of the disease :—

I.—Relation between the clinical state and the globulin reactions.

Clinical state	Nonne-Apelt			Noguchi			Takata-Ara			Pandy		
	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%
Stage 1 ...	183	44	24.04	165	5	3.03	181	57	31.49	89	13	14.61
" 2 ...	77	50	64.93	76	10	13.15	76	55	72.36	38	18	47.36
" 3 ...	46	44	95.65	45	20	44.44	46	46	100.00	15	15	100.00
Total ...	306	138	45.09	286	35	12.23	303	158	52.14	142	46	32.39

II.—Relation between the quantity of albumen and the globulin reactions.

Albumen in gms. per litre.	Nonne-Apelt			Noguchi			Takata-Ara			Pandy		
	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%
0.19 or < ...	69	1	1.44	68	0	0.00	69	2	2.89	27	0	0.00
0.20 to 0.39	131	37	28.24	115	3	2.60	129	51	39.53	67	8	11.94
0.40 to 0.59	72	63	87.50	69	13	17.39	71	71	100.00	34	24	70.58
0.60 or > ...	34	33	97.05	34	19	55.88	34	34	100.00	14	14	100.00
Total ...	306	134	43.79	286	35	12.23	303	158	52.14	142	46	32.39

III.—Relation between the cells and the globulin reactions.

Num. of cells per cmm.	Nonne-Apelt			Noguchi			Takata-Ara			Pandy		
	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%	Num. cas.	Re-act. pos.	%
0-9 ...	182	26	14.28	165	1	0.60	179	39	21.78	86	5	5.81
10-49 ...	57	47	82.45	55	3	5.45	57	53	92.98	28	17	60.71
50-99 ...	19	18	94.73	19	5	26.31	19	18	94.73	9	6	66.66
Over 100 ...	48	47	97.91	47	26	55.31	48	48	100.00	19	18	94.73
Total ...	306	138	45.09	286	35	12.23	303	158	52.14	142	46	32.39

These three tables show the comparative value of the reactions of Nonne-Apelt, Noguchi, Takata-Ara, and Pandey. According to these figures the reaction of Takata-Ara, which is the easiest technique, gives the greatest percentage of positive results, but that of Pandey discloses the greatest specificity. The author believes that suboccipital puncture is preferable to lumbar puncture.

Referring to the treatment of the disease, great stress is laid on dietary. An inadequate diet will frequently change simple carriers of the trypanosomes into severe cases of sleeping sickness. It is not simply a question of food deficient in quantity or quality, but in a great number of cases the monotony of the diet. W. Y.

JAMOT (E.). La lutte contre la maladie du sommeil au Cameroun. [**Campaign against S.S. in Cameroon.**—*Ann. Inst. Pasteur.* 1932. Apr. Vol. 48. No. 4. pp. 481-539. With 14 text figs.]

This lengthy article should be consulted in the original by those interested. The author summarizes his conclusions as follows:—

The method of prophylaxis, which is in operation in the Cameroons, has for its primary objective the destruction of the reservoir of the virus in the circulation, thus controlling the foci of infection and preventing their extension. It is proposed in the second place to cure those patients who are curable. Diagnosis is made by examination of the blood and gland juice. The search for the infected is fundamental for the author's method of prophylaxis. All inhabitants without exception ought to be visited periodically. This cannot be left to subordinates and the doctor himself must direct the inspection.

All patients are treated energetically by such drugs as atoxyl, tryparsamide, novarsenobenzol, emetic of aniline, moranyl and orsanine. It does not appear to the author necessary to perform lumbar puncture before prescribing treatment. The trypanocidal action, that is to say the prophylactic action of the treatment, is controlled by blood examination.

All the contaminated areas have been examined and all patients discovered have been treated; but efforts have been particularly concentrated on the great foci of central and eastern Cameroons. The limits of these foci have been carefully determined. All the patients discovered have been provided with a tally and registered, and they are revisited periodically and treated. As the result of this treatment, the indices of new morbidity and of the virus in the circulation, which are the criteria of the efficacy of the procedure, have been considerably reduced.

In the subdivision of Yaoundé, the new morbidity amongst the Mvelés fell from 36 and 52 per cent. in 1926-1927 to 0.9 and 1.3 per cent. in 1930, and amongst the Manguinass from 17.8 per cent. in 1928 to 0.04 per cent. in 1930. At Akonolinga, it fell from 42 per cent. in 1922-1923, and 23.2 per cent. in 1926-1927, to 2 per cent. in 1930. Amongst the Badjoués of Lomié it fell from 60 per cent. in 1926 to 19.9 per cent. in 1928 and 4.1 per cent. in 1930. At Bertoua and at Deng-Deng it decreased from 28.6 in 1928 to 0.2 per cent. in 1930. The indices of the virus are reduced proportionally, and consequently so is the risk of infection.

These figures show that in all the foci the scourge is on the retreat, but this does not mean that it is everywhere vanquished. Near places where the disease is rapidly disappearing there exist zones of

resistance and even occasional spots where it is taking the offensive. The conflict is consequently not over, but the gains are already considerable.

In many regions, but lately infected, the disease has become a rarity. The old cases are gradually disappearing. The mortality from sleeping sickness has decreased notably and its toll is often less than that of the general mortality of uninfected regions. The birth-rate increases in equal degree. In two words sleeping sickness in the Cameroons is no longer an important factor in the death rate, fall of the birth rate, and depopulation. W. Y.

CORSON (J. F.). **Experiments on the Transmission of *Trypanosoma brucei* and *Trypanosoma rhodesiense* to Man.**—*Ann. Trop. Med. & Parasit.* 1932. Mar. 19. Vol. 26. No. 1. pp. 109–115.

The author points out that one of the chief problems in the study of human trypanosomiasis is the relationship between the three polymorphic trypanosomes, *T. gambiense*, *T. rhodesiense* and *T. brucei*. In the production of numerous posterior-nuclear forms in the blood of experimental animals, and in its susceptibility to human serum, *T. brucei* resembles *T. rhodesiense*, and the two parasites are only distinguished by the fact that one infects man and the other is not known to be able to do so. Attempts to distinguish the two by serological tests have not hitherto met with much success.

From the point of view of practical tropical hygiene, three important questions need investigation. One is whether *T. gambiense* becomes changed in its distinguishing characters by repeated cyclical passages through such tsetse flies as *G. morsitans*, *G. pallidipes* and *G. swynnertonii*. The second is whether *T. brucei*, occurring in areas where human trypanosomiasis is unknown, can infect man. The third question is what changes may occur in *T. rhodesiense* by prolonged stay in the bodies of the lower animals. The two latter questions may be summarized by saying that we need to find out if *T. brucei* can become *T. rhodesiense* or *T. gambiense*, or if *T. rhodesiense* can become *T. brucei*. TAUTE's well-known experiments support the working hypothesis that there is a polymorphic trypanosome of animals, *T. brucei*, that cannot infect man, and another, *T. rhodesiense*, that infects man and lower animals also. One of the most promising lines of research would be to transmit *T. rhodesiense* by one of the species of game tsetse through a series of antilopes, and finally to see if it had lost its infectivity to man; in other words, if it became *T. brucei*.

The experiments with *T. brucei* and *T. rhodesiense* described in detail in this paper were carried out at Tinde, Tanganyika Territory.

The author summarizes his conclusions as follows:—

" 1. A strain of *T. brucei* that had been maintained by direct inoculation in various animals for four and a half years was found to be easily transmissible by tsetse flies to guineapigs. Two European volunteers did not become infected after having been bitten by these infective flies.

" 2. A strain of *T. rhodesiense*, that had been maintained by direct inoculation in goats and sheep for nineteen months, was found to be easily transmissible by tsetse flies to guineapigs. A European volunteer, inoculated subcutaneously with the blood of one of the infected guineapigs, became infected, the incubation period being six or seven days. The infection was transmitted from the infected man to rats by inoculation of

blood. It may be said that a strain of *T. rhodesiense* had not become converted into *T. brucei* by a stay of nineteen months in the bodies of goats and sheep.

"3. It would seem that domestic animals need to be taken into account as possible means of spread of sleeping sickness.

"4. It is very desirable that work with antelopes should be undertaken in order to advance our knowledge of the subject of animal reservoirs of human trypanosomes."

W. Y.

CORSON (J. F.). **The Results of Successive Bites of an Infected Tsetse Fly.**—*Jl. Trop. Med. & Hyg.* 1932. May 2. Vol. 35. No. 9. pp. 136-137.

After referring to two facts, viz. (1) that *Glossina* may remain infected with *T. gambiense* for prolonged periods and probably for the whole of its life, and (2) that, if not very hungry, it frequently inserts its proboscis several times before sucking blood, the author passes to a description of an experiment performed with a specimen of *G. morsitans* which was infected with a strain of *T. rhodesiense* that had been maintained in sheep and goats for 19 months. The infective fly, kept alone in a small wide-mouthed bottle, closed with cotton mosquito gauze, was put to bite white rats. Having bitten a number of rats in succession, the fly was then fed on a guineapig. On two days, Jan. 14th and 17th, the fly bit three rats in succession during a few minutes and then a guineapig. All the animals that were bitten became infected. Details of the experiment are given in a table.

The following is the summary :—

"It was found that successive bites of an infective tsetse fly caused infection in laboratory animals in every case. It therefore seems likely that in Nature tsetse flies may cause many more infections than would be represented by the number of times that they fed. Apart from the difficulty of the morphological similarity of *T. rhodesiense* and *T. brucei*, it is difficult to see how local infectivity rates of tsetse flies, obtained by dissection, could be of much value in *T. rhodesiense* areas, even if the incidence of infection of man were much higher than is actually observed. The behaviour of infective flies may be so variable in regard to biting and feeding that the number of cases of sleeping sickness may have little relationship to the number of infective flies."

W. Y.

CORSON (J. F.). **A Note on the Susceptibility of Some Birds and Wild Animals to Infection with *Trypanosoma rhodesiense*.**—*Jl. Trop. Med. & Hyg.* 1932. Apr. 15. Vol. 35. No. 8. pp. 123-124.

In previous papers [this *Bulletin*, Vol. 28, p. 920 and Vol. 29, p. 300] the author has described attempts to infect native fowls, guineafowl, francolins and hyrax by inoculation with *T. rhodesiense*. He here records further similar experiments made at Tinde. Two species of francolins were used, a larger and a smaller. Of the former 7 of 17 inoculated became infected, but none of 5 of the smaller species; 81 guineafowl were inoculated and 7 became infected; 30 domestic pigeons with no successes, and 2 Muskovy ducks both of which became infected.

Of 12 native fowls inoculated, one became infected. Of 21 hyrax all became infected. A young fox developed a fatal infection, as also did a young jackal. Two porcupines were inoculated and one developed a transient infection. A cane-rat developed an acute infection. One young warthog was bitten by an infective *Glossina*

morsitans and 3 others were inoculated subcutaneously. Apparently, none of the 4 became infected. The article concludes with the following remarks :—

“ Similar experiments with tsetse flies would be of some interest, though it is unlikely that the results would be qualitatively different from those of transmission by inoculation. The results in the case of francolins, guinea-fowl, hyrax and warthogs, suggest that it would be worth while to sub-inoculate rats from considerable numbers of these creatures living in an area badly infested with ‘ game ’ tsetse flies.” W. Y.

LEGER (Marcel) & SICÉ (A.). Considérations sur les modifications pathologiques tardives du liquide céphalo-rachidien dans la trypanosomiase humaine. [**Late Changes in the Cerebrospinal Fluid in S.S.**].—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 340–347. With 3 charts in text.

In a previous communication [*ante*, p. 283], the authors have drawn attention to the fact that meningeal lesions may develop early in the course of human trypanosomiasis; they found definite changes in the spinal fluid within 6 or 7 months of the commencement of the disease.

In the present paper they describe certain cases in which the meningeal lesions develop slowly and are but little marked; and they ask themselves whether this is due to the fact that the meningeal barrier remains good for a longer period than usual, or whether it is due to a chronic meningo-encephalitis.

They find from this new support for their thesis that the classical division of sleeping sickness into “ first stage ” and “ second stage ” cases is not justifiable [*loc. cit.* p. 281]. As in syphilis—where one should no longer speak of primary, secondary and tertiary stages—so in trypanosomiasis, the meningeal lesions may appear at any time, either early or late.

The difficulty of clearing up the point is largely due to the fact that the great majority of patients are Africans who do not come voluntarily to complain of their health, but are only discovered in the course of systematic inspections. Consequently, the matter can only be investigated in Europeans in whom the commencement of the disease is usually noticed; one can thus fix the approximate date of infection and by lumbar puncture the meningeal changes can be recognized long before the appearance of meningeal symptoms.

A number of examples of cases with late development of nervous lesions is given in detail. W. Y.

DE MARQUEISSAC (H.). Note sur les modifications que peuvent subir le sang et le liquide céphalo-rachidien des malades atteints de trypanosomiase à virus *gambiense* lorsqu'ils sont laissés sans traitement. [**Changes in the Blood and Cerebrospinal Fluid in Untreated Gambiense Infection.**].—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 317–319.

The author refers to the well-known phenomenon that trypanosomes may disappear spontaneously from the blood of a patient in the absence of treatment. The parasites undergo degeneration before their disappearance. It was decided to re-examine this question and also to ascertain what happened to the spinal fluid in patients left without treatment.

Twenty cases were selected and kept in hospital under observation. Examinations were made of the gland juice, of fresh and stained preparations of the blood, of the urine, the pulse, the formol-gel reaction, and of the cerebrospinal fluid. Three, and sometimes four, examinations of the blood were made daily at the same hours. No drug was given during the period of observation which varied from 11 to 51 days.

The 20 cases were classified as follows :—

- 5 patients with cerebrospinal fluid normal or but slightly changed.
- 3 patients with cerebrospinal fluid showing pronounced lymphocytic reaction, but without trypanosomes.
- 12 patients with very pronounced lymphocytosis, with an excess of albumose and with trypanosomes in the spinal fluid.

Sixteen of these 20 patients have had their cerebrospinal fluid re-examined after a period without treatment varying from 10 to 51 days. Of 5 in whom the cerebrospinal fluid at the beginning was but slightly altered, 3 showed an increase of lymphocytes, 2 an increase of albumose and 1 showed trypanosomes 16 days after the first puncture. The author asks himself whether it is necessary to blame the lumbar puncture? Of 3 patients belonging to the second category the spinal fluid showed itself at each examination to be more rich in lymphocytes, but the amount of albumose was not changed.

Among the patients belonging to the third group, who had at the first examination parasites in the spinal fluid, important variations in the number of lymphocytes were observed; but in none of the 12 cases did the trypanosomes disappear spontaneously from the spinal fluid.

There was no evidence that variations in the blood infection depended on the integrity of the nervous system, because the positive blood examinations in the three groups were respectively 65 per cent., 76 per cent. and 71 per cent.

In conclusion it is remarked that the formol-gel reaction was much more marked when the defensive powers of the patient were well developed; in cachectic patients it might be negative. W. Y.

TOULLEC & ALAIN. Sur un cas de trypanosomiase africaine. [A Case of S.S.]—*Marseille-Méd.* 1932. Jan. 25. Vol. 69. No. 3. pp. 117-119.

Details are given regarding a Senegalese case of sleeping sickness infected in Haute-Volta. The man was admitted to hospital on the 26th November, 1931, repatriated from Tunis, with a diagnosis of emaciation, general poor condition, and bronchitis. The dossier of the case shows that he was enlisted for 5 years in January, 1923, and was sent to France and then Morocco. He returned to France in November, 1926, and from November, 1927, to February, 1928, he was given leave and went home. In July, 1929, he embarked for Bizerta, and since then he has lived in Tunis. The man had apparently remained in good health and without medical history until September, 1931. According to the author one of the chief points of interest regarding the patient is the length of the incubation period. The date of infection could not have been later than July, 1927 [?1929], and for more than two years afterwards the patient served in the army in a normal manner. Another point of interest was the large number of parasites in the peripheral blood, certain preparations of the blood containing one or two trypanosomes to a field. Notwithstanding intense mental symptoms, the cerebrospinal fluid was normal. It is probable, therefore, that these symptoms, which were of recent development, are to be attributed to the intensity of the infection. W. Y.

CHESTERMAN (Clement C.). **Some Results of Tryparsamide and Combined Treatment of Gambian Sleeping Sickness.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 415-435.

The observations recorded in this paper are the result of 11 years' work. They relate to 17 "first stage" cases and 251 "second stage" cases. The author presents his results in a series of tables. The first table gives details of the 17 "first stage" cases treated with various doses of tryparsamide. All these cases have been observed for periods varying from 4 to 10 years (mostly 7 to 10) since the termination of treatment, and all were cured. Tables II to V give the results obtained with patients who had been unsuccessfully treated with other drugs, e.g. atoxyl, tartar emetic, and stibenyl. In Tables VIa, VIb and VIc we find records of 140 cases treated by tryparsamide alone. These cases are grouped according to the size of the dose of tryparsamide administered. In the remaining tables the results obtained by combination of tryparsamide and other drugs are given.

The author summarizes his conclusions as follows:—

"Treatment by Tryparsamide alone.

"Later experience has necessitated a modification of the opinions expressed in previous publications by the author (1923, 1924 and 1925), when less drastic treatment was advocated and more prolonged courses deemed necessary [this *Bulletin*, Vol. 20, p. 694; Vol. 22, p. 139; Vol. 23, p. 58.]

"*First Stage* cases should receive six to eight weekly injections of medium doses (0.07 gram per kilo for children, 0.055 gram per kilo for young persons and 0.045 gram per kilo for adults). A second course is not necessary.

"*Second Stage* cases should receive six to eight weekly injections of large doses (0.09 gram per kilo for children, 0.07 for young persons and 0.06 for adults).

"The maximum dose for adult is 4 grams. It is permissible to use a preliminary medium dose, but definite grading is bad.

"*Advanced Second Stage* should receive two or three large doses at five-day intervals, then a rest for ten to fourteen days in order to appreciate the condition of the eyes. It is better to give a rest than to diminish subsequent dosage.

"The first four injections are probably the all important ones. Long continued treatment after resistance is established is useless as a hope of cure. So also are subsequent courses although life may be prolonged for many years. Such treatment may produce great tolerance with no visual trouble and patients are apt to become fat, flabby, and lethargic.

"*Results after Five Years* can be counted as accurate and it should be possible to cure at least 50 per cent. of second stage cases, and approximately 100 per cent. of first stage cases.

"*The Relapse.*—So-called relapses are in reality non-cures, owing to trypanosome resistance. The appearance of trypanosomes in the blood, a phenomenon known to be very variable in untreated cases, is but an indication of their re-emergence from so-called inaccessible regions and little importance should be attached to their fortuitous discovery in the blood. It is not necessary to suppose the subsequent evolution of a resistant strain in old standing cases, the trypanosomes have probably been resistant from the first month of treatment and remained so. That the blood may remain free after repeated examination in non-cured cases may but be due to the fact that the multiplication of trypanosomes is retarded or actually prevented by the action of the drug on their metabolism.

"*The Cerebrospinal Fluid.*—To know the cell content of the C.S.F. at the commencement of treatment is of importance, more perhaps for the first stage case than for the second, for if it is normal the former need not be subjected to serious risk of optic atrophy.

" The response of second stage cases to the drug cannot be foreseen from the cell content of the C.S.F. nor do they react proportionally to it. The cell count can always be reduced to normal or very slightly raised figures by a course of tryparsamide but it is not possible to say that the patient is really cured. Time alone can tell that, a negative blood later on does not mean a cure necessarily, and a positive formol-gel serum does not mean a failure.

" A raised cell content a few weeks after the course need not indicate failure, for it may slowly progress to normal limits after the cessation of treatment. Resistant cases kept under the influence of tryparsamide, although going down hill may preserve a count of under 100 cells per mm., although the albumin content combined is disproportionally increased.

" *Combined Treatments.*—The association of tryparsamide and tartar emetic has not in our hands given better results than treatment by the former alone.

" The most promising combination is a course of tryparsamide as outlined above, preceded by two or three large doses of Bayer 205 (say three doses of 1.5 gram for an adult at three- or four-day intervals).

" A rest should then be allowed for ten to fourteen days or till the urine becomes practically free of albumin before administering tryparsamide in medium to large doses. Special care must be exercised if it is desired to preserve full vision at all costs.

" *Treatment in the Field.*—Proved first stage cases only should be left to the care of natives at bush centres where they should be treated by normal six to eight injections of medium doses of tryparsamide. If reasons of economy dictate, atoxyl or soamin may be substituted ; or Bayer 205 may be used.

" Second stage cases (after diagnosis by lumbar puncture) should be given one to three doses of Bayer 205 as circumstances permit, pending their concentration at treatment centres supervised by a medical man.

" After the completion of the preliminary course of Bayer 205 he should then treat these patients (who must receive a liberal and accustomed diet) for other debilitating diseases such as the presence of helminths, taking care not to damage the liver by carbon tetrachloride, and then proceed to the course of tryparsamide carefully examining by simple tests the peripheral vision of *every* patient before *every* injection.

" We have no evidence of our own, nor have we seen any published records which would tend to modify the opinion expressed earlier by the author (1924) that Bayer 205 alone will not cure second stage cases.

" Second courses of tryparsamide are not justifiable either on grounds of economy, hope of cure or the prevention of contamination of glossina. If non-cured patients cannot be removed from fly areas they should receive blood sterilising injections of Bayer 205 every few months until death."

[This excellent and important paper is followed by a critical discussion, in which the reviewer, HANSCHALL, LOW and MURGATROYD took part.]
W. Y.

MANSON-BAHR (Philip). **The Results of Treatment of African Trypanosomiasis in Europeans with Tryparsamide and Bayer 205.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 479-486. With 2 charts in text.

Since the publication in 1923 by Low and himself of cases of sleeping sickness treated by Bayer 205, the author has had an opportunity of observing 11 other cases of trypanosomiasis in Europeans over a considerable period. Three of these were *T. rhodesiense* infections, and the remainder were due to *T. gambiense*. Some of the cases, which relapsed clinically and parasitologically after intensive Bayer 205

treatment, were cured by subsequent tryparsamide, and *vice versa*. Clinical details of the 11 cases are given. Manson-Bahr states that his results appear to agree with those of CHESTERMAN in one important respect, viz., that combined treatment of trypanosomiasis is more effective than the pushing of one drug to the extremes of tolerance after parasitic relapses have occurred. Manson-Bahr considers that success does not depend so much upon the size of the dose or the length of the course of treatment, at any rate in first stage cases, but rather upon the age of the infection and the spacing of the drug. *T. rhodesiense* infections were the more difficult to cure. One case was treated immediately on the appearance of symptoms and showed no reaction to tryparsamide, but responded immediately to Bayer 205. Another case appeared at first to be equally resistant to both remedies but eventually recovered after suffering from serious disturbance of the vision; it is doubtful whether this patient would have been cured unless the second course of tryparsamide had been pushed to the limit, because Bayer 205 had little effect.

The author thinks that Bayer 205 followed by tryparsamide gives the most hopeful outlook; the former drug should be given to the extent of 3 gm. in the first week, and the subsequent tryparsamide injections should be given in tolerated doses. Three of the patients received as much as 6 gm. per week, but possibly this dose is too much for the average European. There was only one instance of optic neuritis and in this the damage was not serious, but it appeared as if tryparsamide dosage 10 months previously had rendered the patient more liable to toxic disturbance from this drug. W. Y.

SAUNDERS (G.). **The Results of the "Six Strong Injections" Course of Atoxyl.**—*West African Med. Jl.* 1932. Apr. Vol. 5. No. 4. pp. 64-65.

The results are given of the treatment of 26 cases of sleeping sickness by a course of "6 strong injections of atoxyl," i.e. 6 doses, each consisting of 2 cgm. per kilo., at intervals of 10 days. The maximum individual doses should not exceed 1.1 gm. Of the 26 cases 15 (58 per cent.) were apparently cured. The author points out that in estimating the value of this course it must be remembered that it was designed by the French for use in a very heavily infected country with an average infection rate of 29 per cent., reaching 77 per cent. in some areas. In such a country it is obviously justifiable to expose the individual to risks which would not be justifiable in less heavily infected areas. No such heavily infected areas have so far been found in the Gold Coast. The author is of opinion that the margin of safety between a curative dose and a blinding dose of atoxyl is so small that close supervision of its administration is necessary, and therefore the cheapness of atoxyl would be neutralized by the expensive organization necessary for its administration. W. Y.

DE MARQUEISSAC. Contribution à l'étude de l'emploi du 270 Fourneau (orsanine) dans le traitement de la trypanosomiase humaine. [**Orsaniline in the Treatment of S.S.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 252-260.

The author has tested the therapeutic value of 270 Fourneau or orsaniline (o-oxy-p-acetyl-amino-phenyl arsinic acid) on a large number

of cases of trypanosomiasis in the first and second stages of the disease. Of 106 first stage cases, of which 97 had received no previous treatment, 87·5 per cent. were cured. In all, 251 second stage patients were treated, 213 of whom had had no previous treatment. The results were as follows:—Blood relapses 35 per cent.; progressive evolution 13·1 per cent.; prolonged amelioration 51·3 per cent.; deaths 14·3 per cent. The doses given varied from 15 mgm. to 30–35 mgm. per kilo. and the total amount from 300 to 350 mgm. per kilo. of weight. The duration of treatment was 10 to 12 weeks.

The effect of the drug on the following points was investigated:—

1. *Weight of the patient.*—In 72 per cent. of cases the weight increased as the result of treatment.

2. *Effect on the lymphatic glands.*—The immediate result was a disappearance of the glands in 77·8 per cent. of cases, but after 2½ months this had fallen to 62·7 per cent. Every puncturable gland was negative whether the puncture was made immediately after treatment or two months later.

3. *Effect on blood sterilization.*—Immediate sterilization was observed in 96·7 per cent. of cases, and of 122 patients kept under observation for 2 months 95 per cent. remained sterile.

4. *Effect on the cerebrospinal fluid.*—In 28 cases the cerebrospinal fluid was examined before and after treatment; the results are shown in the following table:—

Spinal fluid normal before treatment. 15 cases.		Spinal fluid abnormal before treatment. 13 cases.			
Normal after treatment.	Abnormal after treatment.	Not followed.	Normal after treatment.	Improved after treatment.	Stationary.
14	1	1	9	3	0

5. *Effect on the general condition.*—The observations made on 128 patients are summarized in the following table:—

	Before treatment.	Immediately after treatment.	Two months after the last injection.
	Per cent.	Per cent.	Per cent.
Bon état	28	70	78
Assez bon état	58	21	17
État général médiocre ...	12	8	4

A number of old cases of sleeping sickness which had previously been treated with other drugs (atoxyl or tryparsamide) were given orsanine. All these patients had parasites in their blood at the time orsanine treatment was commenced. The immediate result was peripheral sterilization in 19 (79 per cent.) of the 24 cases; in 5 the blood remained positive. Before treatment the proportion of cases in bad condition was 37 per cent. After treatment it fell to 20 per cent. In 79 per cent. the weight increased, in 8 per cent. it remained stationary and in 13 per cent. there was a loss of weight.

Among the accidents following administration of orsanine vomiting was noted 17 times out of 151 cases and diarrhoea 12 times. The latter, which was, as a rule, only met with in bad cases, was sometimes very severe and caused cessation of treatment. Only one abscess resulted from 1,051 injections. Ocular troubles—both slight and grave—were occasionally observed. W. Y.

MURAZ (G.) & VAISSEAU (G.). De divers types d'arséno-résistance dans les traitements actuels (A.E.F.) de la trypanosomiase humaine. [**Different Types of Arsenic Resistance in Treatment of S.S.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 260–279.

The author calls attention to the frequency of arsenic-resistance after the use of tryparsamide or trypoxyl (atoxyl), and the desirability in such cases of having recourse to mixed treatment. He also emphasises the necessity of prolonged observation, extending over years, of cases apparently cured. In addition he records a number of observations showing that feeble atoxylyzation may at times suffice to produce definite cure. The observations are grouped as follows:—

A.—Two cases of arsenic resistance showing that tryparsamide at times, after producing a transient amelioration, results in a pathological condition refractory to further treatment.

The authors believe that this condition is probably due to some change in the behaviour of the trypanosome. They suggest that it may have been produced by unsuccessful treatment with arsenicals of previous patients, from whom the infection was subsequently passed on to the two cases now described.

B.—Twenty-two cases of arsenic-resistance of trypanosomes of the peripheral circulation in relation to tryparsamide. This arsenical exerts a selective action on trypanosomes localized in the meninges, but often fails to sterilize the blood and lymphatic system.

In the present cases it was found that the treatment with tryparsamide had produced marked improvement in the cerebrospinal fluid, but that trypanosomes were still present in the blood. Therefore, after the treatment of second stage cases, it is necessary to examine the blood as well as the cerebrospinal fluid; and also it is advisable to give two or three doses of atoxyl (10 mgm. per kilo.) before commencing with the tryparsamide.

C.—Six cases of arsenic-resistance to atoxyl showing different types of relapse after massive treatment with this drug.

Relapses, as shown by the blood, usually occur about 5 to 6 months after the end of treatment.

D.—Seven cases showing the possibility of a very gradual evolution of trypanosomiasis several years after courses of atoxyl which had been systematically repeated. This evolution was revealed by lumbar puncture, which showed a slight or marked change in the cerebrospinal fluid.

Consequently, it is necessary to follow the patients during many years.

E.—Thirteen cases in which atoxyl given alone, and often in comparatively feeble doses, had sufficed to produce complete sterilization. This complete sterilization is evidenced by a normal cerebrospinal fluid, and by negative examinations of the peripheral blood 8 to 10 years after the original treatment.

During the course of the discussion on this paper, FOURNEAU stated that in his laboratory BOVER had observed that the various arsenical compounds exhibit different tendencies to produce arsenic-fast strains of trypanosomes. Usually, several passages are required and this is the case with tryparsamide and with orsanine. In exceptional cases, such as with oxymethylaminoarsinic acid, a single dose is sufficient and the strain so produced is resistant not only to this compound, but also to orsanine. FOURNEAU considers that this aspect of chemotherapeutic agents is of great importance. W. Y.

VAN HOOF (L.). Essai de deux nouveaux antimoniaux, le Dn 7 et le Dn 9, dans la trypanosomiase humaine. [**Trial of Two New Antimonials in S.S.**].—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 181–198.

The author tested the therapeutic action of two compounds received from the Union Chimique Belge on a number of cases of human trypanosomiasis. These substances, Dn 7 and Dn 9, had been previously tried on experimentally infected laboratory animals by DUBOIS [*ante*, p. 297]. Dn 7 is an antimonyl-bisoxiquinolin sulphurate of diethylamine and contains 16·7 per cent. of antimony. Dn 9 is the oxyquinolin stibio-sulphurate of diethylamine; it contains 34·38 per cent. of antimony in the pentavalent form.

Dn 7 was tried on 12 cases of sleeping sickness; it was well tolerated in doses of 0·25 to 0·50 gm. and was given intravenously. The first injection may produce transient symptoms, but they disappear during the course of treatment. There is no evidence of cumulative action or of intoxication. Peripheral sterilization is produced within an hour by a dose of 5 to 7 mgm. per kilo.; the duration of sterilization was about 15 days. The author believes that a dose of 0·5 gm. is well tolerated by the average native, but adds that it may be wise to give a preliminary dose of 0·25 gm. The drug can be given daily, but in practice it was given every other day, i.e. about 1·5 gm. per week. The exhaustion of his supplies prevented the completion of his observations.

Dn 9 was tried on 13 cases of sleeping sickness. It was well tolerated in the same doses as Dn 7 and seemed to produce less disturbance. Its action, however, was much less regular. The optimum dose was 0·5 gm. and it can be given every other day up to a total of 5 gm. without producing any trouble. Details of the cases treated by the drugs are given in two tables.

In a footnote it is stated that Dn 7 was given to an animal infected with an arsenic-resistant *T. gambiense*. The parasite was not destroyed by 0·08 gm. of atoxyl per kilo. A monkey of 1,810 gm. was cured by an intravenous injection of 0·02 gm. of Dn 7. W. Y.

VAN DEN BRANDEN (F.). Essai de traitement de la trypanosomiase humaine par une méthode biologique. [**(Unsuccessful) Treatment of S.S. by a Biological Method.**].—*Ann. Soc. Belge de Méd. Trop.* 1931. Dec. 31. Vol. 11. No. 4. pp. 395–397.

The author has tested on 9 cases of sleeping sickness the biological method of treatment advocated by ARNAUD. This consists in obtaining, aseptically, serum from a case of sleeping sickness in good condition, with trypanosomes in the blood, and storing it in the

incubator at 37°C. for 20 days. To 60 cc. of the serum, 40 cc. of the following mixture are added:—

Formol	...	...	...	0.5 cc.
Phosphoric acid	...	...	...	0.5 cc.
Physiological saline	...	...	...	39.0 cc.

The mixture is allowed to stand for 8 days and then is ready for use. The treatment consists in 4 injections at 3-day intervals, each consisting of 2 cc. of the above mixture and 8 cc. of venous blood.

None of van den Branden's 9 cases received the slightest benefit from the treatment. W. Y.

LAUNOY (L.), NICOLLE (P.) & PRIEUR (M.). De l'action synergique du 205 Bayer-309 Fourneau et de quelques composés organiques d'antimoine, dans la trypanosomiase expérimentale à *Trypanosoma congolense* de la souris. [**Synergic Action of Bayer 205 and Organic Compounds of Antimony in *T. congolense* Infection of Mice.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 65-77. [23 refs.]

This work is a continuation of that previously described [this *Bulletin*, Vol. 27, p. 834 and Vol. 28, p. 906]. The authors found that "Fourneau 309" in doses of 4 mgm. to 5 mgm. per 20 gm. of mouse rarely cured mice infected with *T. congolense*. Similarly the trivalent antimonial compounds did not cause sterilization if given in doses not greater than 50 per cent. of the lethal dose; and the pentavalent aromatic antimonial stibenyl caused only temporary disappearance of parasites if given in doses of at least 4 mgm. When, however, "Fourneau 309" and the antimonial compounds are given together, in the doses mentioned above, cures are not rare. The results, which are given in tables, show that sometimes as many as 80 per cent. of the animals are definitely sterilized. This is a typical instance of synergic action in therapy. W. Y.

MARZINOWSKY (E. J.). Ueber die kombinierte Wirkung von Novarsolan und ultravioletten Strahlen auf Trypanosomen. [**Combined Action of Novarsolan and Ultraviolet Rays on Trypanosomes.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 3/4. pp. 379-383.

Reference is made to the work of ROSKIN on the combined action of drugs and ultraviolet rays [this *Bulletin*, Vol. 28, p. 911-12]. The technique adopted by the author was similar to Roskin's. Twenty-five mice were infected simultaneously, and equally, with *T. equiperdum*, the hair on the back having been previously removed. On the 4th day, when trypanosomes were numerous in the peripheral blood, each mouse was given 1 cc. of a 1-3,000 solution of novarsolan per 20 gm. of weight; 15 of the mice were then subjected to the action of ultraviolet radiation, and the remaining 10 were kept as controls. The results are set forth in a table, from which it is seen that the 10 control mice all died of trypanosomes within 6 to 14 days. Of the mice subjected to radiation, 2 died shortly after treatment, viz. on the 6th and 8th day respectively; the remainder lived for 30 days or longer. None of them showed parasites in the blood. The author's results, therefore, are in complete accord with those of ROSKIN. W. Y.

RICHET (Ch.) Jr. & DUBLINEAU (J.). Pyrétothérapie associée ou non à l'arsénothérapie dans la trypanosomiase expérimentale de la souris (nagana). [**Pyretotherapy in Nagana of Mice.**—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. pp. 641-643.

The authors have investigated the question whether heat, alone or associated with arsenical treatment, has any therapeutic action on mice infected with nagana.

The animals were warmed by being placed in an oven heated to 37°C. or even higher. This was not always well tolerated, and if the process was prolonged the mice died from heat stroke. As a rule, they tolerated heating to 37°C-45°C. for 2 hours daily. The results of numerous experiments showed that pyrexial therapy alone had no action on the infection. When, however, pyrexial therapy was associated with subcurative doses of N.A.B., it was found to have a definitely beneficial result, and sometimes even resulted in cure.

W. Y.

BROWNING (C. H.), COHEN (J. B.), COOPER (K. E.) & GULBRANSEN (R.). **The Trypanocidal Action of Some Derivatives of Anil and Styryl Quinolines.—II.**—*Proc. Roy. Soc. Ser. B.* 1932. May. 2. Vol. 110. No. B768. pp. 372-377.

The therapeutic action of certain derivatives of anil and styryl quinolines on mice infected with *T. brucei* is summarized in a table. The styryl compounds described had a curative value. The papers are of a technical nature and should be studied in the original by those interested.

W. Y.

KOLMER (John A.) with the assistance of Anna M. RULE. **The Degree of Infection in Relation to the Parasiticide Activity of Chemotherapeutic Compounds.**—*Jl. Pharm. & Experim. Therap.* 1931. Nov. Vol. 43. No. 3. pp. 521-529.

The author states that in conducting tests for the parasiticide activity of chemical agents, the time of their administration in relation to the degree of infection may definitely influence the results. He gives the following summary of his experimental work:—

" 1. Arsphenamin and neoarsphenamin were more effective when given to rabbits three to four weeks after intratesticular inoculation with *Spirochaeta pallida* and when orchitis had developed, than when given immediately after inoculation.

" 2. Arsphenamin, neoarsphenamin, atoxyl, treparsol and other trypanocidal agents were more effective when given to rats eighteen to twenty-four hours after intraperitoneal inoculation with *Tr. equiperdum* than when given immediately or within twelve hours after inoculation.

" 3. In other words these spirocheticidal and trypanocidal agents were more effective in the presence of early light infections than when given for abortive treatment immediately after inoculation.

" 4. When administered after the infections had been given a longer start with a numerically heavier infection, the minimal curative doses were also larger.

" 5. It would appear that the same principle applies to experimental streptococcus infections, that is, that smaller amounts of chemical agents are effective when given after the infection has become established than required if administered immediately after inoculation.

"For these reasons it is recommended that experimental infections be allowed to become established before chemical agents are administered for eliciting possible therapeutic effectiveness in chemotherapeutic investigations." W. Y.

- i. REINER (L.) & LEONARD (C. S.). **Rôle of the NH_2 , OH and As=As Groups in Parasitotoxic Action of Arsphenamine Derivatives.**—*Proc. Soc. Experim. Biol. & Med.* 1932. May. Vol. 29. No. 8. pp. 946-950.
- ii. ——— & ———. **Toxic Action of Hydrogen Peroxide on Trypanosomes and a Note on Chemotherapeutic Mechanism.**—*Ibid.* pp. 951-953.

i. This paper is devoted to a consideration of some derivatives of arsphenamine mainly from a chemical point of view. As the results of experiments in which *T. equiperdum* was exposed to the action of various chemicals *in vitro* for 15 to 60 minutes apparently at room temperature, the authors come to the following conclusion:—

"1. Hiramatsu's reaction" [(colorimetric reaction) between neoarsphenamine and osmic acid] "is given by compounds possessing aminophenol groups and the presence of arsenic is not necessary. 2. p-Aminophenol is not toxic to trypanosomes, but its autooxidation product, probably iminoquinone, is highly toxic. Reducing agents, such as sulfite, thio-sulphate and thiol compounds, inhibit the toxic action. 3. Quinone is toxic to trypanosomes and its toxicity is inhibited by thioglycollate. 4. Various organic arsenious oxides, not capable of giving on oxidation iminoquinone structure, are more toxic to trypanosomes than are oxidized aminophenol and quinone. 5. The toxicity of arsphenamine derivatives to trypanosomes is due chiefly to the presence of trivalent arsenic and not chiefly to hydroxyaminophenyl groupings, although these may contribute to the *in vitro* toxicity."

ii. In this paper similar experiments were performed by exposing *T. equiperdum* to the action of hydrogen peroxide; this is followed by a discussion of the possible part played by the production of peroxides (during the biological oxidations) in relation to the action of arsenicals. The authors come to the following conclusion:—

"Hydrogen peroxide is toxic to trypanosomes. The formation of traces of H_2O_2 under conditions where the catalase content of the system is low cannot be excluded. Such concentrations, although not detectable, might be sufficient to exert some damaging action on trypanosomes. While this factor is probably negligible *in vivo*, it still might be involved with the rate of the —AsO formation and thus concerned indirectly with the chemotherapeutic activity of arsenicals (Santesson)." W. Y.

VON JANCsó (N.). Mechanismus der Arzneifestigkeit bei Protozoen. Zur Frage der Parasitotropie chemotherapeutischer Mittel. [The Mechanism of Drug Resistance in Protozoa.]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Mar. 30. Vol. 124. No. 3/4. pp. 167-176.

The author has previously shown [*ante* p 291] that trypanosomes exposed *in vitro* to trypaflavin become photo-sensitive, presumably owing to the drug they have absorbed. Trypaflavin-fast strains and arsenic-fast strains do not become photo-sensitive in this way. In the present paper he shows that trypanosomes exposed to compounds of the styrylquinoline series (BROWNING, COHEN, ELLINGWORTH, GULBRANSEN) become photo-sensitive in the same manner. If mice infected with normal trypanosomes are injected intravenously with

pyronin, the trypanosomes in the blood become stained within a few minutes, and this is likewise the case in mice injected with styrylquinoline. But if mice infected with trypaflavin-fast, or with arsenic-fast, strains are treated with these two drugs, the trypanosomes do not become stained.

Rats weighing 180 gm. infected with the normal strain were injected with 4 mgm. trypaflavin subcutaneously, and one hour later they were killed. The trypanosomes in the blood were centrifuged off and the trypaflavin extracted from them with absolute alcohol. From 0.4 cc. of the deposit of trypanosomes (dry weight 18 mgm.) there was extracted 0.24 mgm. trypaflavin. He concludes that one-eighth of the drug which had been injected had been taken up by the trypanosomes. The same experiment was performed with rats infected with arsenic-fast and with trypaflavin-fast strains, but from the deposit of trypanosomes only a trace (0.009 mgm.) of trypaflavin could be extracted. Similar experiments were performed in mice and also in rats treated with styrylquinoline. He concludes from these experiments that resistant trypanosomes have lost the power to absorb active drugs, a power possessed by normal trypanosomes. This is in harmony with EHRLICH'S conception of drug-resistance.

The following summary is given by the author :—

By the use of a new method, it has been possible to demonstrate, and analyse quantitatively, the action which occurs between the chemotherapeutic agent and the parasite in the body of the host. By means of the author's photo-biological method, drugs which have a photo-dynamic action can be demonstrated quantitatively in individual trypanosomes. Strongly coloured drugs, pyronin, 2(p-acetylaminostyryl)-6-dimethylaminoquinolin-methosulphate, *i.e.*, styrylquinoline) produced vital staining of the trypanosomes and can be seen within the flagellates. Especial importance is attached to the demonstration that it is easily possible by isolation of the trypanosomes from the treated animal, and extraction of the same with suitable solvents, to regain quantities of the drug which can be colorimetrically estimated. By these experiments, there can be demonstrated the decisive importance of parasitotropism for the production of a curative action.

Investigations with drugs of the acridin-, pyronin-, and styrylquinoline-series in animals infected with *T. brucei* have shown that normal trypanosomes absorb these compounds in the body of the host to an astonishingly large extent, while drug-resistant trypanosomes take up these drugs in comparatively small amounts. This is a demonstration of the correctness of Ehrlich's conceptions, for a difference of the powers of absorption could determine the curative effect only if the chemotherapeutic agent exerts its action directly. The point of attack of the drug lies within the parasites.

Considerable light is thrown upon the nature, mechanism and importance of drug-resistance by the investigations here published.

[This work confirms the results reached by the reviewer and his colleagues *vide* this *Bulletin*, Vol. 28, p. 910.] W. Y.

VON JANCsó (N.). Beobachtungen chemotherapeutischer Vorgänge im Fluoreszenzmikroskop. [*Observations on Chemotherapeutic Processes by the Fluorescence Microscope.*—*Klin. Woch.* 1932. Apr. 16. Vol. 11. No. 16. p. 689.]

This is a short paper continuing the account of the author's experiments with trypanosomes exposed to trypaflavin [*ante*, p. 291-2]. In the present paper he worked with a fluorescence microscope illuminated

with ultraviolet light invisible to the unaided eye. Under such circumstances, trypanosomes and red blood corpuscles are normally invisible. Infected mice were injected with various drugs, such as trypaflavin, pyronin, and styrylquinoline, and the blood containing trypanosomes examined under the fluorescence microscope. Under these circumstances, they were found to have become clearly visible owing to the fluorescence of the drugs which they had absorbed. It was also possible to observe the distribution of the drug in the trypanosome, since in the trypanosomes exposed to styrylquinoline the nucleus was especially conspicuous and, to a lesser extent, the blepharoplast. After trypaflavin the blepharoplast was conspicuous.

When arsenic-resistant trypanosomes were exposed to these drugs in this manner and then examined, they remained invisible, showing that they had not absorbed any of these drugs. This confirms the author's previous experiments on this subject. W. Y.

NEUMANN (Harry). Die chemotherapeutische Abheilung der Trypanosomeninfektion bei jungen Tieren. [**The Chemotherapeutic Cure of Trypanosome Infections in Young Animals.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 1/2. pp. 177-181.

Details are given of experiments in which it is shown that in rats infected with trypanosomes (Nagana Prowazek), and subsequently treated with antimosan or myosalvarsan, relapses are more common, and occur earlier, among the young animals than among the adults. The author believes that this is due to defective immune body formation in the young animals. W. Y.

KROÓ (H.). Antigenwert und chemotherapeutischer Heilerfolg. Ein Beitrag zum Wesen der chronischen Infektionen. [**Antigen Value and Chemotherapeutic Effect.**]—*Klin. Woch.* 1932. Feb. 20. Vol. 11. No. 8. pp. 316-317.

In a previous publication (1931) the author has shown that a strain of *Spirochaeta pallida*, which has been made experimentally resistant to immune serum, has lost the capacity of producing spirochaeticidal antibodies. In the present work he has extended his observations into the realm of trypanosomal infections.

He states that it is a recognized fact that different strains of trypanosomes of the same species may exhibit differences in their susceptibility to arsenicals. He collected three strains of nagana, e.g. "Prowazek," "Hamburg," and "Ferox"; mice infected with the first were always cured by 0.5 cc. of a $\frac{1}{4000}$ solution of neosalvarsan, whereas those infected with the other strains usually relapsed.

In the first group of experiments 8 mice were infected with each of the strains and 24 hours later were given a dose of neosalvarsan, which was certainly curative, i.e. 0.5 cc. of a $\frac{1}{200}$ solution. Seven days later each mouse was given a similar injection of the homologous strain; only 1 of the "Prowazek" mice became infected, but practically all of the "Hamburg" and "Ferox" mice. From these experiments it is concluded that the more susceptible "Prowazek" strain produced better immunization than did the other two strains which were less susceptible to the action of arsenicals.

In the next experiments rabbits were injected intravenously with similar doses of the three strains, and 10 minutes later given a sterilizing dose of neosalvarsan (0.05 gm. per kilo.). Seven days later they were bled and the trypanocidal power of their inactivated sera, against each of the three strains, tested by incubation of the parasites *in vitro* for 1 hour in different dilutions of the immune serum, and subsequent injection of the mixture into normal mice. The mice injected with the treated "Prowazek" strain did not become infected, whereas the others did. From this it is concluded that the chemotherapeutic influence and the antigen value of a parasite are in some way correlated. Somewhat similar experiments conducted with original and relapse strains gave very much the same results. W. Y.

SCHILLING (Claus) & NEUMANN (Harry). Zur Methodik der immunologischen Differenzierungsmethoden von Trypanosomenstämmen. [**The Theory of the Method of the Immunological Differentiation of Trypanosome Strains.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 214–229. With 1 text fig.

Biological methods play an important part in the differentiation of trypanosome species; thus *T. brucei* is killed by human serum, whereas *T. gambiense* is not. For the differentiation of different strains of one species, or of the relapse trypanosomes of one strain, we are absolutely dependent upon immuno-biological reactions. The most important methods for the differentiation of such variants are (1) Preliminary treatment with dead parasites and re-infection, (2) Cure and then re-infection, and (3) Serum experiments (*in vivo* and *in vitro*).

In the course of numerous experiments, the authors found it necessary to ascertain which of these methods was most useful, and how far the reaction can be considered to be specific. They pass to a critical examination of each of the three methods.

1. *Preliminary treatment with dead antigen and re-infection.*—After referring briefly to other work on this method, the authors describe their own technique. They reached the general conclusion that the method is not suitable for the differentiation of trypanosomes, mainly because no adequate protection is afforded the mice by the preliminary injection of dead trypanosomes.

2. *Drug cure and re-infection.*—The only drugs found to produce certain cure of infections due to the authors' old laboratory strains were salvarsan and "Bayer 205." An experiment is described in which three series of mice infected respectively with three different strains of *T. brucei*, viz. "Prowazek," "Ferox" and "Nagana 30," were cured with an intravenous injection of 0.5 cc. of a 1 : 500 solution of neosalvarsan. Each of the mice was re-infected 8 days later with its homologous strain. The results, which are set forth in a table, show that the mice infected with strain Prowazek were immune to re-infection, whereas the others were not. It is therefore concluded that strain Prowazek furnishes the best antigen.

3. *Serum experiments.*—The serum used in these experiments was obtained from animals in which the infection ran a chronic course; in all 103 sera were used; they were obtained from 2 cases of human trypanosomiasis, and from horses, sheep, goats, a calf, a dog, rabbits,

guineapigs and mice. The freshly obtained centrifuged serum was heated at 45°C. for 30 minutes, whereby all remaining trypanosomes were killed. The serum was then stored in the ice-chest for 1-20 days (as a rule 1-3 days) until it was required for an experiment. To 0.5 cc. of the serum 0.1 cc. of a weak trypanosome suspension was added, and, after an hour's sojourn in the incubator, the mixture was injected into mice. By means of this technique it is possible to distinguish between the original Prowazek strain and the original "Ferox" or "Nagana 30" strains. That is, "Prowazek" immune serum protected against the Prowazek strain, but not against "Ferox" or "Nagana 30" and *vice versa*. Similarly the technique allowed of the differentiation of the original and relapse strains. A large number of experiments are described and must be consulted in the original by those interested. The authors conclude that the serum experiments constitute far the best immunological method for trypanosome differentiation.

W. Y.

SCHNITZER (R.). Untersuchungen zur Chemozeptorentheorie. VIII. Mitteilung. Das Tantalssystem. Die biologische Struktur des "Arsenozepors." *Investigations on the Chemoreceptor Theory. VIII. The Tantalum System. Biological Structure of the "Arsenoreceptors."*—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 75. No. 1/2. pp. 143-155. With 1 text fig.

In this paper the author resumes his experiments on the phenomenon of "Chemotherapeutic Interference." As an example of a drug which produces "interference" he used potassium hexatantalate, the action of which was described by MORGENROTH and ROSENTHAL in 1911. He finds that the tantalate will interfere with the chemotherapeutic action of tartar emetic, of salvarsan, and of arsenophenylglycine, but not with that of trypaflavine, arsacetin, or amino-oxyphenylarsenoxide. On the other hand, para-fuchsin "interferes" with the action of the arsenoxide, but not with that of arsenophenylglycine. From this and previous experiments he elaborates a somewhat complicated theory of the structure of the chemoreceptor-mechanism; for the details of this theory the original paper should be consulted. In its broad outlines, the theory postulates that the chemoreceptor consists of two parts: firstly, a primary binding nucleus (Bindungskern), which is non-specific and which combines with the chemotherapeutic agent, and secondly, "toxo-sensitive groups" (giftempfindlichen Gruppe) highly specific for each particular drug. During the production of drug-resistant parasites it is these latter toxo-sensitive groups which undergo a change. He explains "Chemotherapeutic Interference" on the supposition that para-fuchsin combines with the primary binding-nucleus, and so prevents the taking up of more toxic drugs, such as trypaflavine; and he compares the action of para-fuchsin in this respect to that of Ehrlich's "toxoids." He considers that there are two main binding-nuclei, *viz.*, that reacting with para-fuchsin and that reacting with tantalate. The first combines with trypaflavine, pentavalent arsenicals, and arsenoxides; and the second with tartar emetic and arsenophenylglycine. Salvarsan combines with both, but more strongly with that corresponding to para-fuchsin.

W. Y.

NATTAN-LARRIER (L.) & NOYER (B.). Ultrafiltration et pouvoir protecteur des immun-sérums anti-trypanosomes. [**The Protective Power of Filtered Immune Sera.**—*C. R. Soc. Biol.* 1932. Mar. 11. Vol. 109. No. 9. pp. 702-704.

It has been shown in previous papers [this *Bulletin*, Vol. 28, p. 371 and Vol. 29, 303] that the protective and curative substances of human serum traverse collodion membranes which will hold back alexine. In the present work the authors have subjected to ultrafiltration the sera of animals infected with trypanosomes and have inquired whether the filtered serum possesses the same protective power as the unfiltered serum. It was found that collodion membranes which allow the passage of the protective and curative substances in human serum arrest the corresponding substances of immune serum. The same membranes under similar conditions likewise arrest alexine, the natural anti-sheep haemolysin of human serum, the anti-syphilitic sensibilisatrice, and the anti-sheep haemolysin obtained in the rabbit.

W. Y.

NATTAN-LARRIER (L.), NOYER (B.) & BÉDIER (E.). Action de la chaleur sur le pouvoir anti-trypanosome du sérum humain. [**Action of Heat on the Anti-Trypanosomal Power of Human Serum.**—*C. R. Soc. Biol.* 1932. June 3. Vol. 110. No. 19. pp. 241-244.

As the result of their filtration experiments [*ante*, p. 303] the authors consider that it is necessary to distinguish between the curative substance and the protective substance of human serum. In the present work they have inquired whether the two substances behave differently when exposed to the action of heat. A number of experiments are described in detail from which it is concluded that exposure to a temperature of 59°C. for a sufficient period enfeebles the curative power and destroys the protective power of human serum. Consequently, the authors believe that the protein molecules of the protective substance are larger and less resistant to heat than are those of the curative substance.

W. Y.

SCHIEFF (Georg). Ueber den intermediären Stoffwechsel der mit Trypanosomen infizierten Meerschweinchen. [**Intermediate Metabolism of Guinea-pigs infected with Trypanosomes.**—*Biochem. Ztschr.* 1932. May 14. Vol. 248. No. 1-3. pp. 168-180. [10 refs.]

In this paper the author continues his observations on the metabolism of experimental animals infected with *T. equiperdum*, using guinea-pigs instead of rats [this *Bulletin*, Vol. 27, p. 242]. From his results he comes to the conclusion that the biochemical processes which cure infected guinea-pigs are essentially the same as those which cure infected mice, with this difference, that certain peculiarities can be observed, corresponding to the longer duration of the disease and the undulating course of the infection, which are not seen in rats. The fundamental changes found are the following:—

1. A hypoglycaemia, which reaches its most extreme degree shortly before the death of the animal, but which can also be seen during the earlier stages, although to a less extent, every time the trypanosome count reaches a high degree.

2. A hyperglycaemia is observed a few days after the diminution of trypanosomes. This is especially marked following the cure produced by germanin at an advanced stage of the infection; but it can also be seen in a less marked degree during the spontaneous diminution in the number of trypanosomes during the earlier periods.

3. A hyperlipaemia in the advanced stages of the infection.

4. Considerable diminution of the glycogen and diminution of the neutral fat in the liver even in the later stages of the infection. The author interprets these changes roughly as follows:—

When trypanosomes are numerous in the blood they tend to utilize large amounts of glucose, so producing the hypoglycaemia, and this tendency to hypoglycaemia is increased by the damage suffered by the liver (as shown by blood-sugar curves after diminution of glucose). To counteract this the body of the host increases its output of glucose; and when the number of trypanosomes rapidly diminishes (following the administration of germanin or as a result of spontaneous crisis) this increased output of glucose results in hyperglycaemia for several days. The increased fat content of the liver results from the damage which it has suffered, and it is complementary to the diminished glycogen content. The author considers that these metabolic changes are not specific for trypanosomiasis, but occur also in other infections.

Observations are also recorded on changes in the serum proteins of infected animals. Seven tables are given in which the biochemical changes observed are clearly recorded.

W. Y.

THOMSON (J. G.) & DE MURO (P.). **The Influence of *Treponema duttoni* on an Infection with *Trypanosoma rhodesiense* in Mice.** —*Jl. Trop. Med. & Hyg.* 1932. Feb. 1. Vol. 35. No. 3. pp. 33-36. [10 refs]

After a brief reference to observations indicating that one infection may be antagonistic to another, the authors pass to a description of their own work on the influence of *Treponema duttoni* on *T. rhodesiense* infections in mice. The effect of these two organisms on one another could be determined with accuracy owing to the constant and uniform results produced by each separately on mice. *Treponema duttoni* usually appeared in the peripheral blood of mice about the 4th day after inoculation; they became numerous on the 5th and 6th days, but on the 7th, 8th and 9th days they were either entirely absent from the blood, or present in only very small numbers. They reappeared on the 10th, 11th and 12th days, thus producing the first relapse, disappearing again on the 13th and 14th days, reappearing once more on the 15th, 16th and 17th days, thus reproducing the second relapse, and disappearing finally about the 28th day. In mice inoculated with *T. rhodesiense* the trypanosomes appeared in the blood about the 3rd day and increased in number until the death of the mouse on the 5th, 6th or 7th days.

The effect of the spirochaete infection on that of the trypanosomes was tested at various stages of the disease, but the most striking results were obtained when spirochaetes and trypanosomes were inoculated simultaneously. Marked effects were also produced when trypanosomes were inoculated on the 8th day or immediately after the first spirochaetal crisis. Details of the experiments are shown in tables. The lives of 21 mice were markedly prolonged when spirochaetes and trypanosomes were inoculated simultaneously. Spirochaetes and

trypanosomes disappeared from the blood simultaneously, from which the authors conclude that some trypanocidal substance develops in the serum simultaneously with the disappearance and destruction of the spirochaetes. After the mice have recovered from the relapsing fever infection they quickly succumb to trypanosomiasis. W. Y.

DE BRAUWERE (P.) & LISFRANC (J.). Un essai de prophylaxie anti-trypanosomique au "Bayer 205" et au "Tryponarsyl Meurice." [Prevention of S.S. by Bayer 205 and Tryponarsyl.]—*Ann. Soc. Belge de Méd. Trop.* 1931. Dec. 31. Vol. 11. No. 4. pp. 387–393.

With the object of ascertaining the prophylactic value of Bayer 205 and of "tryponarsyl Meurice," the authors have undertaken experiments among the people of the Semlik plain. Trypanosomiasis has ravished the population of this district during the last twenty years, and in the particular part where the authors' experiment was undertaken, the disease, which had been sporadic for some time, became definitely endemic in 1926. The following table shows its progress since that time :—

Year.	No. examined.	New cases	Percentage.
1926	?	14	?
1927	1,319	41	3·1
1928	1,317	69	5·2
1929	2,009	297	14·78
Feb. 1930	3,058	376	12·30

The experiment was undertaken during the months of March and April, 1930. The first group received three weekly injections of 1 gm. of Bayer 205, and the second 5 injections of 2 gm. of tryponarsyl Meurice at fortnightly intervals. All suspected cases were carefully eliminated.

1. *Bayer 205 group.*—This experiment was carried out at Capita Makora, 38·7 per cent. of the population of which were infected. Seventy-six adults were given 3 doses of 1 gm. of the drug, 23 adults 2 doses of 1 gm., 17 children 3 doses of 0·5 gm., and 7 individuals 3 doses of 0·2 gm. The results of the experiments are summarized in the following table :—

Date.	No. examined.		Found to be infected.	
	Injected.	Controls.	Injected.	Controls.
2. 6. 30	105	7	—	—
20. 9. 30	106	32	1	7
17. 2. 31	95	14	8	4
19. 6. 31	87	31	6	—

2. *Tryponarsyl Meurice group.*—This experiment was undertaken in four heavily infected villages, about a quarter of the population of which was infected. The first injections were given on the 4th March, 1930: 224 adults received 4 doses of 2 gm. of the drug, 114

adults 3 doses of 2 gm., 35 adults 2 doses of 2 gm., 93 children 4 doses of 1 gm., 31 children 3 doses of 1 gm., and 12 children 2 doses of 1 gm. The injections were complete on the 23rd April. The results are summarized in the following table:—

Date.	No. examined.		Injected found to be infected.						Controls found to be infected.
			Gland infections.			Lumbar puncture.			
	Injec- ted.	Con- trols.	4 inj.	3 inj.	2 inj.	4 inj.	3 inj.	2 inj.	
31. 5. 30	414	530	—	—	—	—	—	—	16
25. 9. 30	385	1,719	—	—	—	—	—	1	76
21. 2. 31	356	2,182	7	4	2	—	1	—	62
15. 6. 31	335	1,512	1	2	2	2	—	1	49
			8	6	4	2	1	2	203
23									

The author concludes from this work that in order to cause the disappearance of a focus of the infection by prophylactic medication, it would be necessary to repeat the procedure every six months. The choice of the drug will probably be Bayer 205 because of the convenience and rapidity of its administration, and the possible danger of producing resistance by insufficient doses of trypanarsyl.

W. Y.

DE MARQUEISSAC (H.). Contribution à l'emploi du Moranyl (205 Bayer, 309 Fourneau) donné à titre préventif dans la trypanosomiase humaine (secteur de Pagouda, Togo). [**Preventive Use of Moranyl in S.S.**].—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 347-353.

The author has carried out an experiment in three villages of Lama-Tessi designed with the object of ascertaining the value of Bayer 205 given prophylactically. The population is very dense; at the recent census in 1931, the number of inhabitants was found to be 19,690 in an area of 240 sq. kilometres. The percentage found to be infected with trypanosomes was 18 in 1927, 35 in 1928, 40 in 1929, 3.2 in 1930, and 5 per cent. in 1931.

The three villages chosen for the experiment were Assire with 9 per cent. of new cases at the 1931 census, Kagnessi with 7 per cent. of new cases, and Siou-kaoua with 3 per cent. of new cases. Each inhabitant selected for the experiment was the subject of two examinations of the blood and one of the gland juice; the dates of these examinations were 25th July, 1931, for Assire, 6th August for Kagnessi, and 29th August for Siou-kaoua.

The individuals who were negative and who were clinically quite healthy were divided into two lots; pregnant women and very young children were excluded. The first group were given Bayer 205 and the second kept as controls. Each individual moranylied (Bayer 205) had his counterpart from the point of view of age, weight, and family in the control group. So far as possible one brother was moranylied

and the other not, and one sister was placed in each group, as also were husband and wife. By this means it was endeavoured to make the experiment as fair as possible. Each moranylized individual was given one injection of 0.02 gm. of Bayer 205 per kilo. of weight.

All the cases, treated and untreated, were re-examined between 20th and 30th November, 1931, i.e. 123 days after treatment in the case of Assire, 109 days in the case of Kagnessi, and 82 days in the case of Siou-kaoua. The results are given in the following table :—

Villages.	Age and sex.	No. moranylized.	No. of controls.	Period between injection and examination in days.	No. of moranylized and found positive.	No. of controls found positive.	Index among moranylized.	Index among controls.
							%	%
Assire ...	Men ...	33	32	123	5	1	15	3
	Women ...	21	21		2	1	9	4.7
	Children ...	41	42		4	4	9.7	9
	Total ...	95	95		11	6	11.5	6.3
Kagnessi ...	Men ...	19	21	109	2	2	10	9.5
	Women ...	15	15		2	2	13	13
	Children ...	24	29		5	4	20	13
	Total ...	58	65		9	8	15	12
Siou-Kaoua ...	Men ...	30	28	82	3	2	10	7
	Women ...	20	22		2	1	10	4.5
	Children ...	47	47		1	4	2	8.5
	Total ...	97	97		6	7	6	7
Conclusions	Men ...	82	81		10	5	12	6
	Women ...	56	58		6	4	10	17
	Children ...	112	118		10	12	8	10
	Total ...	250	257		26	21	10	7
	General total ...	507			47		8.5%	

After stating that these figures are disappointing, the author passes to a consideration of previous observations on the prophylactic value of "Bayer 205" in human trypanosomiasis and in experimental trypanosomiasis of animals. Finally, he lays down certain conditions which he considers should govern any future experiments of this kind.

W. Y.

CLARK (Herbert C.) & DUNN (Lawrence H.). **Experimental Studies on Chagas' Disease in Panama.**—*Amer. J. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 49-77.

The recent discovery of Chagas' disease in Panama has aroused considerable local interest, since the clinical and pathological records of the Panama canal zone have shown no entry of a case of this disease during the past twenty-seven years. The authors' studies have consisted in searching for *T. cruzi* in blood smears of large numbers of children and of numerous animals, of inoculations with the parasites

into other animal hosts, and of the collection of a large number of *Triatoma geniculata*, the arthropod believed to be the principal invertebrate host of the disease in Panama, with observations on the infections of these insects with trypanosomes.

The first case of human trypanosomiasis found in Panama was that of an infant admitted to Santo Tomas Hospital on the 1st December, 1930. This case and two others discovered about three months later have already been reported by MILLER [this *Bulletin*, Vol. 28, p. 922]. The 4th infected child was discovered on March 2nd 1931, and a 5th on August 20th 1931. The authors give the following summary of their work :—

" 1. Five cases of Chagas' disease have been found in children in Panama during the past ten months.

" 2. Rabbits, guineapigs and white rats were inoculated and became positive with heavy infections from one of these human cases. This strain was successfully transferred to a monkey, guineapigs, white rats, white mice and bats.

" 3. A young dog naturally infected with trypanosomes that appear to be identical with those found in the human cases was discovered at the home of the first human case.

" 4. Guineapigs, white rats and white mice were infected through inoculation of blood from a naturally infected dog. This strain was carried on to other guineapigs and a bat.

" 5. Twenty-eight armadillos, *Dasypus novemcinctus fenestratus* Peters were examined and six, or 21.4 per cent., were found to be infected with a trypanosome that we believe to be *T. cruzi*.

" 6. Eighty-one opossums, *Didelphis marsupialis etensis* Allen, were examined and twenty or 24.6 per cent. were found infected with what was apparently *T. cruzi*.

" 7. A squirrel, kept as a pet in the house where two cases of Chagas' disease lived proved to be infected with a trypanosome identical with *T. cruzi*. This was the second occasion in which a pet, in the same household with one of the five human cases, was found positive for trypanosomes.

" 8. Bats infected with a trypanosome believed to be *T. cruzi* were found in Panama. A total of 161 of these flying mammals was examined and 30, or 18.6 per cent. proved to be infected. Those found positive represented 5 species.

" 9. The trypanosome of the bats was readily transmitted to dogs, guineapigs, white rats and white mice.

" 10. Ninety specimens of *Triatoma geniculata* were collected in the Chilibrillo Caves. This completes a record of infected *Triatoma*, infected bats and an infected opossum found in the same chamber of these caves.

" 11. The feces of 55.5 per cent. of the bugs proved to contain trypanosomes.

" 12. Twenty-six guineapigs were each inoculated with a macerated *Triatoma* and 21, or 80.8 per cent., became positive.

" 13. Seven guineapigs became infected through *Triatoma geniculata* feeding upon them. It was not determined whether these infections were caused through the bites of the bugs or through infection with their feces.

" 14. The incubation period of the experimentally infected animals varied from three to twenty-eight days.

" 15. The degree of the infection in the experimentally infected animals varied considerably. One guineapig had a peak peripheral infection of more than 1,600 trypanosomes in a thick blood film.

" 16. The persistence of infectivity has extended in 1 guineapig for more than two hundred and seventy-eight days.

" 17. Although all our laboratory animals could be infected with this trypanosome the guinea-pig seemed to be the most satisfactory for experimental purposes. The adult animals proved so susceptible to infection that no very young ones were used.

" 18. The trypanosomes soon disappear from the peripheral blood of the human cases. Infected animals have lived for a considerable number of days since the beginning of their infection and in some of them trypanosomes have been found for many days.

" 19. Leishmania forms of the trypanosome have been found in the hearts of some animals but others fail to show them.

" 20. Our experience indicates that this trypanosome does not possess a high degree of virulence. However, we cannot read what the future holds in store in the way of remote serious sequelae." W. Y.

DIAS (Emmanuel). *Le Trypanosoma cruzi* pendant les premières phases de l'infection expérimentale. [*T. cruzi* in the **Early Stages of Experimental Infection.**]—*C. R. Soc. Biol.* 1932. May 27. Vol. 110. No. 18. pp. 203-205.

After experimental inoculation of small animals with *T. cruzi*, the parasites appear in the peripheral blood within a few hours and remain almost constant in number during the first four days. On the 5th day there is a sudden increase in number due to invasion of the blood by parasites which have multiplied in the tissues.

The intracellular evolution in the tissues is similar to that in the bug and *in vitro*. The crithidial forms have but a very short existence and are quickly transformed into young forms (thin and very motile flagellates). During the first acute phases of the infection the intracellular cycle is completed within 5 days.

The initial distribution of the parasites varies according to the site of inoculation. After subcutaneous inoculation, some of the parasites pass into the blood, whilst others penetrate the cells of the neighbourhood and multiply there intensely; some of those which pass into the blood remain there and some become localized in various organs. After peritoneal inoculation the parasites gradually escape into the blood or tissues. Phagocytosis is quite exceptional.

The author observes that he has not seen the initial blood phase after inoculation of the intestinal contents of infected *Triatoma* into guinea-pigs and mice; the trypanosomes in these cases are not found in the blood before the 11th day. W. Y.

DIAS (Emmanuel). *Le Trypanosoma cruzi* et ses rapports avec le système réticulo-endothélial. [*The Reticulo-endothelial System and T. cruzi* Infection.]—*C. R. Soc. Biol.* 1932. May 27. Vol. 110. No. 18. pp. 206-210. With 3 text figs.

As mentioned in the previous article, after subcutaneous inoculation of *T. cruzi*, the parasites penetrate the cells of the region and multiply there. Those invaded are the cells of the "peripheral reticulum" and the clasmatoctes. In the dog the region of inoculation is intensely parasitized by the 5th day. Amongst the cells particularly invaded are those constituting the sheaths of the striated muscles and sometimes even the muscular fibres themselves. The clasmatoctes are the cells most frequently parasitized. On the 12th day the lymphatic glands have been found to be heavily invaded. As the disease progresses, the trypanosomes spread to all the organs. Generally speaking, it can be said that the cells parasitized belong in great part to the

histiocytic-reticulum, comprising the reticular cells of the haemolymphopoietic organs and of the endothelium, and the clasmatocytes.

T. cruzi is, however, not entirely a parasite of the reticulo-endothelial system, but is adapted to other cells, particularly muscle fibres, testicular cells, etc. This is in contrast with *Leishmania* which is more exclusively adapted to the reticulo-endothelial system. The author considers that the adaptation of *T. cruzi* for the other cells mentioned is only rendered possible as a result of its adaptation to the reticulo-endothelium. W. Y.

VILLELA (Eurico) & VILLELA (Eudoro). [In Portuguese & English.] Elementos do sistema nervoso central parasitados pelo *Trypanosoma cruzi*. **Elements of the Central Nervous System parasitized by *Trypanosoma cruzi*.**—*Mem. Inst. Oswaldo Cruz*. 1932. Vol. 26. No. 1. In Portuguese pp. 77-79. In English pp. 80-81. With 11 figs. on 2 plates.

VIANNA was the first to show that the neuroglia cells are infected by *T. cruzi*, but recent work has shown that it is not the only cell to be involved. Up to the present the nerve cells themselves were believed not to be parasitized, but the work of the authors has convinced them that these cells may be infected by *T. cruzi*, and figures are given showing pyramidal cells from a dog's cortex full of parasites. The authors believe that the particular strain used by them, viz. the *Tatusia* strain, exhibits a distinct neurotropism; and they actually found that in dogs infected with this strain the parasites abound in the central nervous system and are rare in the heart muscle. W. Y.

MAZZA (Salvador). *Triatoma geniculata* agent de transport de *T. cruzi*. Nouveaux cas de fièvre de Malte en Argentine. [*T. geniculata*, **Carrier of *T. cruzi* in the Argentine.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 145-146.

The author records the discovery of *Triatoma geniculata* at Florencia situated in the north of Santa Fé. This *Triatoma* lives in the burrows of *Dasypus novencinctus* which explains the frequency of natural infections of *T. cruzi* in them. W. Y.

MURAZ (G.). Quelques derniers mots au sujet de la "Cure-standard" de la maladie du sommeil. [**Last Words on the Standard Cure of S.S.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 39-43.

In this article the author continues, and presumably winds up, the polemic on this subject. [For previous references see this *Bulletin*, Vol. 27, p. 814, Vol. 28, pp. 351 and 352, and Vol. 29, p. 287-8]. W. Y.

HECKENROTH. Le traitement de la trypanosomiase humaine africaine, à *T. gambiense*. [**Treatment of *T. gambiense* Infection.**]—*Arch. de Méd. Gén. et Colon.* formerly *Rev. Méd. de France et des Colonies*. 1932. Feb. Vol. 1. No. 2. pp. 79-84.

This is an article of a general nature dealing with the various drugs of use in the treatment of human trypanosomiasis. It requires no special notice. W. Y.

- BROWNING (C. H.), COHEN (J. B.), ASHLEY (J. N.) & GULBRANSEN (R.).
**The Antiseptic and Trypanocidal Action of Certain Styryl and Anil
Quinoline Carboxylamides.**—*Proc. Roy. Soc. Ser. B.* 1932. Apr. 1.
Vol. 110. No. B767. pp. 249-260.

This is a chemical paper of a technical nature and should be consulted
in the original by those interested. W. Y.

- DELBREIL (Jean). Sur un cas de maladie du sommeil avec formol-
leucogel-réaction positive, négativée par la tryparsamide. [**Case of
S.S. with Formol Gel Reaction negativated by Tryparsamide.**]—*Bull. et
Mém. Soc. Méd. Hôpît. de Paris.* 1932. May 30. 48th Year. 3rd
Ser. No. 18. pp. 760-763.

Details are given of a case of sleeping sickness, successfully treated
with tryparsamide, in which a strongly positive formol-gel reaction
disappeared during the course of treatment. W. Y.

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- COHEN (Aaron), KING (Harold) & STRANGEWAYS (Winifred I.). Trypanocidal
Action and Chemical Constitution. Part X. Arylthioarsinites.—Re-
printed from *Jl. Chem. Soc.* 1931. pp. 3043-3057.
- COHEN (Aaron), KING (Harold) & STRANGEWAYS (Winifred I.). Trypanocidal
Action and Chemical Constitution. Part XI. Aromatic Arsonic Acids
containing Amide Groups.—Reprinted from *Jl. Chem. Soc.* 1931. pp.
3236-3257.
- COHEN (Aaron). Trypanocidal Action and Chemical Constitution. Part XII.
Arylthioarsinites derived from κ -Thiolundecoic Acid.—Reprinted from
Jl. Chem. Soc. 1932. pp. 593-598.
- SAUNDERS (G.) & MORRIS (K. S.). Suggestions for the Control of Human Try-
panosomiasis.—*West African Med. Jl.* 1932. Apr. Vol. 5. No. 4.
pp. 62-64.
- TUBANGUI (Marcos A.) & YUTUC (Lope M.). The Resistance and the Blood
Sugar of Animals infected with *Trypanosoma evansi*.—*Philippine Jl. Sci.*
1931. May. Vol. 45. No. 1. pp. 93-107. With 7 text figs. [15 refs.]
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BLACKWATER FEVER.

OTT. Recherches sur la pathogénie et le traitement de la fièvre bilieuse hémoglobinoïdique. [**Researches on the Pathogeny and Treatment of Blackwater.**].—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. 494–512.

The author has asked himself whether decrease in the red cell resistance in certain cases of chronic malaria may not pave the way for the haemoglobinuric crisis by rendering the red cells sensitive to the action of numerous toxic substances, endogenous or exogenous, biological or chemical, arising spontaneously or introduced in some manner (alimentary, therapeutic). He has also inquired what part the cholesterinaemia factor plays in the variations of this resistance and whether cholesterol is of any therapeutic value. He points out that haemolysis is an abnormal phenomenon, to some extent controlled by the experimenter in whose hands the red cell is caused to yield up its haemoglobin under the influence of the most diverse reagents. He considers therefore it is desirable to ascertain what happens to the red cell when tested against a great number of haemolytic agents and not to limit oneself, as has become a custom, to the measurement of its resistance to hypotonic saline. Then again there are various known substances which exert a protective action on red cells; amongst these cholesterol has a biological importance.

In the first part of his work the author has determined the red cell resistance (cholesterinaemia being in action) of Annamites—healthy, malarial and haemoglobinuric—against the following three kinds of haemolytic reagents:—(a) Physical agent: hypotonic saline. (b) Chemical agent: three salts of quinine. (c) Biological agent: anti-human sera.

Full details are given of the technique employed and the results of the observations are set forth in tabular form.

The next section of the paper relates to the subject of cholesterinaemia and the manner in which hypercholesterinaemia can be provoked. Finally, the author passes to a consideration of the effects of induced hypercholesterinaemia on the red cell resistance. [For details this interesting paper must be consulted in the original.]

The author summarizes his conclusions as follows:—

1. *Red cell resistance.*

A. In the normal Annamite the red cell resistance is equal to that of the normal European.

B. In the Annamite infected with malaria: (a) The resistance to hypotonic saline varies in different individuals; it is often diminished, especially in the pyrexial period, but sometimes also during the height of the fever. (b) The resistance to the quinine salts does not exhibit any modification from the normal.

C. During blackwater fever red cell fragility is the rule. (a) Against hypotonic saline this is very marked; (b) Against the quinine salts the resistance is normal, with the exception of quinine forms towards which there is in the course of blackwater fever an elective fragility of the red cells.

II. *Cholesterinaemia.* This must be estimated not only in the serum, but also in the red cells.

A. In the normal Annamite the degree of cholesteræmia is definitely less than in the normal European; this is undoubtedly a matter of race, but it is also one of alimentation.

B. In malaria a hypocholesteræmia, more or less pronounced, appears to be the rule.

C. In blackwater fever this hypocholesteræmia is still more pronounced.

III. *Induced hypercholesteræmia.* This is easy to produce by injection of cholesterin in oily solution; it ought to be measured not only in the serum but also in the red cells. It arises from a superactivity of the cholesteringenetic centres which are stimulated by the infection. It is often not apparent in the serum, but it manifests itself by a surcharge of the red cells with cholesterin; this is especially marked in the hæmoglobinuric.

IV. *Effects of induced hypercholesteræmia on the red cell resistance.*

A. The hypercholesteræmia is followed after some hours by an increase in the red cell resistance to hypotonic saline; this is seen equally well in the hæmoglobinuric as in the malarial subject.

B. Increase of resistance to the quinine salts is only seen in the hæmoglobinuric and only in respect of the quinine formas.

C. Contrary to the effect which it has on the other hæmolytic agents, hypercholesteræmia sometimes results in a diminution of the red cell resistance to the hæmolysins of antihuman sera.

W. Yorke.

BRAHMACHARI (Upendranath), BRAHMACHARI (Phanindranath) & BANERJEA (Radhakrishna). **Studies in Black-Water Fever.** - *Amer. Jl. Trop. Med.* 1932. Mar. Vol. 12. No. 2. pp. 117-122.

Whatever may be the mechanism of blackwater fever, there is no doubt that there are many cases in which quinine is a determining factor and its administration may be followed by severe hæmoglobinuria, while in other cases quinine has little or no influence upon the disease. The authors state that the disease may therefore be classified as follows:—

"1. *Quinine-intolerant type.* This includes cases in which hæmoglobinuria is precipitated by the administration of quinine. It can be subdivided into two groups:

"(a) *Mild* in which the hæmoglobinuria stops as soon as quinine is discontinued.

"(b) *Severe* in which hæmoglobinuria persists after the discontinuance of quinine and the condition may end fatally.

"2. *Quinine-tolerant type.* This includes cases in which hæmoglobinuria has little or no relationship with administration of quinine."

Details are given of a case of malaria in which it was possible experimentally to evoke hæmoglobinuria, the degree of which could be varied by increasing or diminishing the dosage of quinine. The patient, a boy of six years of age, was intolerant to almost any dose. When he came under observation, he was suffering from malignant tertian malaria, the spleen was enlarged, and the blood contained *P. falciparum*. The following observations were made:—

(1) Quinine bihydrochloride, $\frac{1}{2}$ grain, twice a day gave rise to frequent yawning, weakness, and faint hæmoglobinuria.

(2) Quinine bihydrochloride, 1 grain, gave rise to pain in the abdomen and limbs, well-marked haemoglobinuria, jaundice, and a distinct rise of temperature.

(3) Quinine bihydrochloride, $2\frac{1}{2}$ grains, was followed by a quick and feeble pulse, intense pain in the limbs and abdomen, great prostration, marked haemoglobinuria and jaundice, and a temperature up to 105°F . These somewhat alarming symptoms subsided in 48 hours.

(4) Quinine bihydrochloride, 5 grains, was followed by intense haemoglobinuria, very severe prostration, and drowsiness. The condition was almost fatal.

The authors point out that the treatment of malaria in cases of this type is evidently one of the most difficult problems in tropical medicine.

The second part of the paper consists of observations on the action of quinine on erythrocytes in cases of blackwater fever. The author adopted the usual technique of mixing a suspension of washed erythrocytes in saline with ascending strengths of quinine hydrochloride. The following are in substance the conclusions :—

The erythrocytes in blackwater fever are slightly more vulnerable to quinine than those of normal individuals, and equally so before, during, and after disappearance of the haemoglobinuria. The increased vulnerability is so slight that it cannot account for blackwater fever following quinine administration. W. Y.

MANOUSSAKIS (E.). Hémoglobinurie quinique et bilieuse hémoglobinurique. [**Quinine Haemoglobinuria and Blackwater Fever.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1931. July 20. Year 47. 3rd Ser. No. 25. pp. 1422–1426.

After mentioning general reasons why, in his opinion, quinine haemoglobinuria should be distinguished from blackwater fever, the author states that he has had the opportunity of studying a considerable number of cases of each disease, and that he proposes to indicate briefly the points whereby the two—which have nothing in common except the colour of the urine—can be distinguished.

Details are given of the case of a soldier, who contracted malaria in 1917, and continued to suffer from it until 1921, because each attempt at quinine treatment was followed by an attack of haemoglobinuria. He was only cured when he left his native country and went to live in Piræus. When he was subsequently mobilized he reported his quinine idiosyncrasy. It was decided to test his reaction to quinine and on 28th Dec. (1930 ?) an injection of 0.1 gm. was given; this dose was well tolerated, but a further injection of 0.25 gm. of quinine provoked a serious attack of haemoglobinuria. Twenty-two hours later, when the urine had cleared, but still gave the Mayer reaction for quinine, a further injection of 0.25 gm. of quinine was injected without ill effect. For the next three days 0.35 gm. of quinine was given daily and was not followed by haemoglobinuria. The quinine was then stopped until 8th Jan., when 0.25 gm. was injected; this was followed by haemoglobinuria. The same evening, before the urine had quite cleared, another dose of quinine was given; and as this was not followed by haemoglobinuria, the administration of quinine was continued.

From this case and others of a similar nature, it appears that :—

1. None of these persons have made use of quinine previous to that provoking the first attack of haemoglobinuria; and this has appeared in all of them after the first dose of the medicament.

2. All cases have had several attacks of haemoglobinuria, and this accident has supervened each time they have attempted to return to quinine.

3. The haemoglobinuric crisis has always occurred within $1\frac{1}{2}$ hours of each dose of quinine, and the intensity of the attack was proportional to the amount of the drug. The haemoglobinuric crises in these cases exhibit the fundamental characters that they invariably occur each time quinine is given after the total elimination of the previous dose, and that they do not occur when quinine is given before the elimination of the previous dose. [See also page 312.]

In the author's view these characters suffice to distinguish quinine haemoglobinuria from blackwater. There are, however, others. In the former condition there is leucopenia with monocytosis. Haemoglobinaemia is constant in blackwater, but never seen in quinine haemoglobinuria. The red cell resistance is always very feeble during the crisis and often after the crisis in quinine haemoglobinuria, whilst in true blackwater the author has never seen lowered resistance.

Clinically the two conditions are quite different. The blackwater patient becomes a veritable human wreck within a few hours, whilst the quinine haemoglobinuric patients remain in good condition. Finally, true blackwater is a condition which occurs only in malaria patients and most frequently in those of long standing, irregularly and imperfectly treated, and spares those regularly treated; it occurs in those who have already taken quinine for many years without ill result, and relapses are exceptional. Quinine haemoglobinuria, on the contrary, depends on a single and unique factor, viz., the absorption of quinine at a time when it is not already present in the circulation. It occurs in a patient infected with malaria or in one who is not infected, and lastly it appears after the first sufficient dose of the drug, and relapses occur every time the drug is given in an intermittent manner.

W. Y.

SAMPSON (B. F.). **Blackwater Fever and its Relation to Malaria.** — *South African Med. Jl.* 1932. May 28. Vol. 6. No. 10. pp. 323-329. [26 refs.]

In this paper, which is speculative, the author elaborates a hypothesis to explain the development of blackwater fever. He states that his object is chiefly to direct a closer scrutiny to a corner of the subject that does not appear to have received sufficient attention, viz., what happens to an individual during those essential previous months in a blackwater area before the advent of his first attack? The author accepts the view that malignant tertian malaria is a *sine qua non* in the development of blackwater, but the incidence of this disease does not always correspond with the intensity of endemic subtertian malaria. The death rate from malaria may be high, and blackwater fever conspicuous by its absence. In contradistinction there exist so-called "blackwater areas" where, for some reason or other, cases are plentiful. Obviously, there must be some factor to explain this. Another baffling problem is that the occurrence of blackwater appears in some curious way to be connected with the arrival of the white settler in certain endemic districts, previous to which the indigenous natives, though heavily infected with subtertian malaria, were singularly free from blackwater. These natives had previously acquired a malarial immunity, so that the advent subsequently of blackwater amongst them is all the more curious. The author asks what connexion can there be between blackwater and the association of the European: and why it is that an immune native, in the ordinary way, does not get blackwater, though

he probably picks up many abortive *P. falciparum* infections? If one takes the attitude that before he can get blackwater he must lose his malarial immunity, then one immediately comes up against the question of how association with a white man affects this question of immunity in natives. The author discusses at considerable length the question of the development of immunity in untreated malaria, and considers that there is some evidence that the reticulo-endothelium is the antibody producer. He remarks that the repeated painting of the skin of a mouse with tar will ultimately produce epithelioma, and he contends that in blackwater fever we have the same thing happening in a chemical sense. Being stimulated or irritated to exhaustion, the reticulo-endothelium liberates a precursor of antibody, which is the haemolytic substance described by NOCHT. In its exhausted state this is the only response it can make; it will occur sometimes after quinine without fever, and sometimes in fever without quinine.

The author sums up his views in the following way :—

" With what, therefore, are we left? At least a fair basis for suspicion that quinine has some very serious effect on the immunity mechanism. It is my belief that its action is one of irritation upon specialized tissue, the function of which, in the ordinary way, being the production of these antibodies [*sic*]. But the product of irritation is not the normal antibody, and yet it has with antibody the common property of being destructive to trophozoites. Moreover, the evil effect of such irritation is particularly marked if it is allowed to operate on this delicate tissue before the specific antibody function has had time to establish itself. And this brings me down to the vital point in the production of blackwater. Given a sufficient intensity of endemic subtertian fever, the first milestone to haemoglobinuria is laid with the thorough and immediate treatment by quinine of the first attack of this type of fever. It may be that the treatment successfully destroys the whole infection. The next parasite picked up by the unfortunate individual may very well be a *Plasmodium vivax*, but this is not essential. It will require considerable quinine, and by the time two or more relapses have been dealt with, his general health will be considerably depressed. Should he now commence substituting vital food elements with alcohol, the level of his general resistance will depreciate still further, but this also is not essential. Put in now another infection with *Plasmodium falciparum*. This is likely to hit him hard, both in consequence of the depressed state of his antibody mechanism and by reason of the low tone of his non-specific resistances. The withholding of quinine at this juncture would be asking for trouble, but the giving of it in adequate doses would be the passing of another milestone to blackwater. It is difficult to assess just how much quinine and subtertian malaria is required in any one individual to bring his immunity mechanism to that state of irritation and depression which is the immediate pre-blackwater state. But there comes a time when the next demand on this specialized tissue will be answered by the production of precursor or immature antibody, and this may be the answer made to any one of the following :— (1) Quinine without fever. (2) Fever without quinine. (3) Quinine and fever. (4) Exposure to cold, trauma, fatigue, other illnesses, etc." W. Y.

LECIEF. Onze cas de bilieuse hémoglobinurique chez les noirs. [**Eleven Cases of Blackwater in Negroes.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 293–310. With 11 charts. [1 ref.]

Within a period of six months the author has had under observation in hospital at Kipushi, 11 cases of blackwater fever in natives. The

patients were all Banyaruandas or Barundis and had been recruited in the territory of Ruanda-Urundi. These natives are heavily infected with malaria. Prophylactic quinine (0.5 gm.) is given daily to the labourers, and as they appreciate the benefit there is no difficulty in getting them to take it. In spite of this quininization, however, the entries to hospital for malaria are numerous.

Of the 11 cases of blackwater, 9 occurred among the surface workers, who were unfit for work underground and who did not take prophylactic quinine. The attack in every instance followed the administration, for an attack of malaria, of a large dose (1 to 2 gm.) of quinine. Clinical details and temperature charts of the various cases are given.

W. Y.

DE DECKER. Quelques observations de fièvre bilieuse hémoglobino-urique chez le noir. [**Blackwater Fever in the Negro.**]-*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 213-224. With 8 charts.

Reference is made to the fact that in 1931 LECLEF notified nine cases of blackwater fever in natives at Kipushi, Katanga. Since the end of March, 1931, the author has had charge of 17 additional cases. In all except one malaria parasites were found in the blood. LECLEF had concluded that the attack of blackwater in his cases was provoked by the administration of large (1 to 2 gm.) doses of quinine, but Decker does not entirely share this view. He considers that the main cause is an individual predisposition in a greatly debilitated malarial subject. All his patients were either debilitated females or surface labourers who had been several times in hospital for malaria or other diseases.

Amongst his small group of cases Decker encountered three relapses and probably he might have seen more had he not made a point of repatriating the convalescents. It is remarked that the exciting dose of quinine was, as a rule, the same as, or even less than, the dose which the patients had previously taken as a prophylactic against malaria. In contrast to LECLEF the author was in the habit of giving his malaria cases relatively small doses of quinine, viz., 0.5 gm. on the first day of admission to hospital, 1.0 gm. on the second day and 1.5 gm. on the third day. Of nine cases, in whom the disease developed after admission to hospital, it occurred before any quinine had been taken in four and in two others after only 0.5 gm. From May onwards all the author's patients had taken regularly 0.75 gm. of quinine twice weekly as a prophylactic. In view of the great number of people admitted to hospital for malaria in Ruanda, it was decided in April to administer prophylactic quinine, and on Tuesdays and Fridays all—men and women alike—were given 0.75 gm. of quinine under the direction of a white supervisor. The author writes that on the one hand he gave 0.75 gm. of prophylactic quinine to 900 men and 500 women, practically all of whom had malaria, without the production of any blackwater fever, and on the other hand some attacks occurred without any quinine and others after only 0.5 gm. in people who had previously taken their prophylactic quinine with impunity.

With regard to treatment, the author states that, immediately a diagnosis was made, quinine was stopped and replaced by plasmochin; when the urine had cleared this was in turn replaced by plasmochin-quinine compound. As a routine 10 to 20 cc. of antivenom serum was given; the author adds that he is not strongly convinced of the efficacy

of this and that two of his cases got better without it. Of the 17 patients three died. The temperature charts and other details are given in respect of nine of the cases. W. Y.

MICKANIEWSKI. Contribution à l'étude de la fièvre bilieuse hémoglobino-urique (à propos de cinquante cas observés sur les hauts plateaux annamitiques). [**Blackwater Fever in Annam.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. Sept. Vol. 9. No. 8. pp. 664-690. [3 pages of refs.]

During a sojourn of nearly five years in the high plateaux of Kontum and Darlac, the author has had under observation 50 cases of blackwater fever. This paper consists of a lengthy and general account of the disease; it contains no new facts and requires no special notice in this *Bulletin*. [It is interesting to note that although a long list of references is given every one of them is French.] W. Y.

TSCHERGECHTOW (A. S.). [**Blackwater Fever in Gandja (Caucasus).**]—*Trop. Med & Vet.* Moscow. 1930. Vol. 8. No. 10. pp. 7-12. [In Russian.]

The author describes seven cases of blackwater fever observed in Gandja; this condition is very rare in the Caucasus, and the present cases were the only ones seen by the author during the last four years in the course of which 11,000 cases of malaria were examined. The conclusions are as follows: All the cases observed are closely associated with malaria; any form of malaria can bring about this condition, but it is especially frequent in cases of malignant tertian; blackwater fever is frequently associated with haemorrhagic phenomena; in two cases the symptoms of haemoglobinuria developed independently of quinine, and in one it could be attributed to quinine idiosyncrasy.

C. A. Hoare.

DE RAYMOND (A.). Note thérapeutique sur le traitement de la bilieuse hémoglobino-urique par le chlorhydrate de choline. [**Treatment of Blackwater Fever by Choline Hydrochloride.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 215-221.

The author considers that it would be extremely interesting to know the degree of cholesteræmia in blackwater fever patients and to ascertain if there is any relationship between the hæmolysis and a definite decrease of blood cholesterol. The author himself has only been able to make observations at Hanoi on chronic malaria cases evacuated from the upper regions; and the amount found by PIERIER, using the method of Grigault, varied from 0.35 cgm. to 0.9 cgm. per litre. PONS, ADVIER, BOREL and GUILLERM have obtained similar results and are of the opinion that hypocholesteræmia is the rule in malaria [see this *Bulletin*, Vol. 23, p. 553]. Unfortunately, the amount of cholesterol present in the blood of patients actually suffering from blackwater fever has yet to be ascertained.

There is, in the author's mind, no doubt that injections of cholesterol are of real value in blackwater fever. These injections, however, suffer from the great disadvantage that they are made with an oil solvent and are consequently but slowly diffusible and of delayed action. In blackwater it is necessary to act quickly; the access is sudden and the course is often short.

It occurred to the author that the proper procedure is to encourage if possible cholesterogenesis. The researches of CARLOS and LEURET on the action of chlorhydrate of choline on the production of blood cholesterol have incited De Raymond to use this product in blackwater fever. He claims that success has awarded his efforts. Cholesterogenesis is stimulated, the degree of cholestaemia rises and haemolysis is immediately impeded. The diffusion of the medicament is extremely rapid, as is shown by the clinical records appended. DE PALMAS claims that in four cases the haemoglobinaemia ceased within an hour of the injection.

Treatment consists in one or two subcutaneous injections of 2 cgm. of chlorhydrate of choline (Biocholine) daily until disappearance of the cardinal signs and arrest of haemoglobinuria.

Details, supplied by various of the author's colleagues, are given regarding nine cases of blackwater fever treated with the drug. [Whether, however, the author's claim "il semble bien que le chlorhydrate de choline agisse d'une façon certaine sur la disparition de l'hémoglobinurie" is justifiable remains to be seen.] W. Y.

LAZZARO (Giuseppe). Sulla cura della malaria nell'emoglobinuria da chinina. [**The Treatment by Quinine of Malaria in Haemoglobinuric Patients.**]—*Riv. di Malariaologia*. 1931. May-June. Vol. 10. No. 3. pp. 269-280. [16 refs.] English summary (8 lines) pp. 419-420.

To give or withhold quinine in the treatment of blackwater fever or in those suffering from malaria who have had blackwater is a subject of ever-recurring interest. The author quotes the varying opinions of the last half century and records six cases of his own. In four of these *P. falciparum* was present, in one *P. vivax*, and in the other parasites could not be found. The author's procedure is to give quinine [salt not stated] "in therapeutic doses," 1-2 gm. in the cases detailed, and to continue it to prevent relapse and cure the malaria. He maintains that quinine given during the attack of haemoglobinuria and for a day or two after does not aggravate the attack nor tend to cause relapse.

H. H. S.

TAYLOR (C. J. S. O.) & RUSSELL (H.). **Blackwater Fever and Naphthalene Poisoning.**—*West African Med. J.* 1932. Jan. Vol. 5. No. 3. pp. 48-49.

Details are given of a case of naphthalene poisoning, the result of swallowing two ground-up camphor balls. The case is recorded because it was at first diagnosed as probably blackwater fever. W. Y.

SCHACHSUWARLY (M.). Beitrag zur Frage der paroxysmalen Hämoglobinurie. [**Paroxysmal Haemoglobinuria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. June. Vol. 36. No. 6. pp. 336-343. [24 refs.]

Clinical details are given from Baku of two cases of paroxysmal haemoglobinuria which came under the author's observation during the early part of 1930.

Case 1. A man aged 30; family history good, no history of syphilis or tuberculosis. Felt ill first in 1924; since then has had many rigors, accompanied by fever and dark urine. The attacks were chiefly in the winter after exposure to cold. Since 1924 he has suffered from malaria; quinine

was well tolerated, but the doctors in Baku and Tiflis warned him against it. A detailed account is given of the condition of the patient on admission to hospital. The Wassermann, Sachsgeorgi and Kann reactions were strongly positive, and the blood contained *Plasmodium falciparum* and *Plasmodium malariae*.

Case 2. A man aged 40; family history good, syphilis in 1921. In 1925, after exposure to heavy rain, he had a rigor accompanied by fever and dark urine. Since then he has had each winter 5 or 6 severe attacks of paroxysmal haemoglobinuria. An account is given of the condition on admission to hospital. The Wassermann, Sachsgeorgi and Kann reactions were strongly positive, but there was no evidence of malaria.

Both patients gave the Ehrlich and the Donath and Landsteiner reactions.

The first problem to be faced in Case 1 was to cure malaria. With this object in view a small dose of quinine was given and, as this had no untoward action, the usual dose of 1 gm. was given the next day, and in addition plasmochin. Then, for several days 2 gm. of quinine was given. Similarly quinine was well tolerated by Case 2. Hence the author was able to confirm the observations of MANNABERG and DONATH that quinine does not provoke haemoglobinuria in this disease.

A paroxysm was produced by means of a foot-bath and a number of observations made throughout the course of the attack. These, which relate to the changes in temperature, the blood pressure, the blood catalysis, the leucocyte formula and the urine findings, are given in a couple of tables.

The following summary is given :—

The etiology of paroxysmal haemoglobinuria is syphilis and an abnormal innervation of the vessels, but not malaria. The malaria attacks did not provoke a paroxysm of haemoglobinuria, nor did the administration of quinine. The autolysin titre was not influenced by quinine in either patient. The exciting causes of an attack of paroxysmal haemoglobinuria are cold, hot water, adrenalin, and excitement. In an attack of paroxysmal haemoglobinuria, the characteristic features are rigor, fever, albuminuria, haemoglobinuria, increase of blood pressure and leucocyte changes. Especially important is a general leucocytosis, accompanied by a lymphopenia and a decrease of monocytes and eosinophils. These leucocyte changes are seen even in abortive attacks. The severity of the disease is dependent on the haemolysin titre. Papaverin treatment modifies certain of the symptoms, but does not influence the haemolytic process. W. Y.

GHIRON (Mario). **On Blackwater Fever.**—*Jl. Trop. Med. & Hyg.* 1932. Mar. 1. Vol. 35. No. 5. pp. 65-71.

This is a translation of a paper published in German in 1927, which was noticed in this *Bulletin*, Vol. 24, p. 657. The translation is described without qualification as an "Original Communication." A. G. B.

GHOSAL (J. N.). Four Types of Blackwater Fever seen in the Mofussil of Bengal. —*Calcutta Med. Jl.* 1932. Feb. Vol. 26. No. 8. pp. 322-327. With 1 chart.

- LOUVEAUX (L.). Observation d'un cas d'hémoglobinurie chez un noir.—*Bull. Méd. du Katanga*. 1930. Vol. 7. No. 5. pp. 129-130.
- REYNOLDS (Fredrick H.). A Case of Blackwater Fever precipitated by Ptomaine Poisoning due to Unclean *Degchies*.—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 198-199.
- SUÁREZ (Ramón M.). Fiebre hemoglobinurica en Puerto Rico.—*Bol. Asoc. Med. de Puerto Rico*. 1931. Oct. Vol. 23. No. 193. pp. 363-379. [23 refs.]
- WEIL. Observations on Blackwater Fever in Galilee.—*Harefuah*. Jerusalem. 1930. Sept.-Oct. Vol. 4. No. 5. p. 259.
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REVIEWS AND NOTICES.

BUROWA (L. F.) & KASSIRSKY (I. A.). **Tropical Diseases in Middle Asia.**—242 pp. With 49 figs. 1931. Moscow-Tashkent: State Publication. [In Russian.]

This is an elementary text-book of tropical diseases, specially adapted to the requirements of medical officers practising in Russian Middle Asia. The diseases dealt with are mainly those caused by animal parasites (malaria, leishmaniasis, amoebiasis, lambliasis, balantidiasis, coccidiosis, relapsing fever, fascioliasis, ankylostomiasis, strongyloidosis, guinea-worm infection). The only other diseases described are sprue, pellagra, and papataci and undulant fevers. An account is given of the aetiology, clinical aspects, pathological anatomy, epidemiology and treatment of each disease. The book is in every respect below the standard of similar text-books published in Europe and America. The authors appear to have no clear notion of the systematics and nomenclature of the parasites described. Thus, the dysentery amoeba is referred to in one place as *Entamoeba dysenteriae*, and in others as *Amoeba histolytica*, while *Iodamoeba bütschlii* is made to represent the genus *Pseudolimax*. The book abounds in misprints, the paper on which it is printed is deplorable, while the illustrations are so defective that little would be lost if the majority had been left out altogether. The majority of references to literature are of Russian works.

C. A. Hoare.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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PLAGUE

LEFROU (G.). Considérations étiologiques sur l'épidémie de peste de 1929 à Saint-Louis du Sénégal. [**Etiology of Plague in 1929 at St. Louis, Senegal.**—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 597-606.]

In this epidemic there was no evidence that an epizootic among rats either preceded, was concurrent with, or succeeded it. Special attention was paid to the matter and captured rats were specially examined for possible plague infection. On the other hand, fleas were very abundant and especially the flea now known as *Synosternus pallidus* and formerly as *Xenopsylla pallida* [*ante*, p. 154]. The conclusion is then drawn that the epidemic was due to transmission of infection from case to case by fleas.

W. F. Harvey.

GOBERT (E.). Le contrôle permanent de la peste en Tunisie. [**The Permanent Control of Plague in Tunis.**—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 456-469. With 6 figs. on 5 plates.]

A description is given of the travelling motor laboratory for plague service, which permits of investigation being carried into the country. It is in the country that the conditions of propagation of plague are most complicated. The flea, for example, can retain plague bacilli in its stomach for months* and ticks can act as vectors as well as fleas. Camels are known to suffer from plague and to be the starting point of epidemics. Man likewise can be the chronic carrier of plague bacilli. Research work is being carried on to determine the distribution of species of rodents and of the parasites which infest them.

W. F. H.

PIQUET (L.). La peste dans le département de Constantine et plus particulièrement histoire de la peste bubonique à Philippeville et de la peste pulmonaire à Mac-Mahon, Barika, Condé-Smendou et Ain-M'lila, en 1930 et 1931. [**Plague in the Department of Constantine. History of Plague in Algeria in 1930 and 1931.**—*Rev. d'Hyg. et de Méd. Préventive.* 1932. Mar. Vol. 54. No. 3. pp. 183-201.]

This is an epidemiological and historical study in which it is claimed that striking demonstration has been afforded of infection passed from man

* La puce, par exemple, peut conserver les bacilles pesteux dans son estomac pendant des mois entiers (p. 464).

and ceasing when contact ceased. This cessation is explainable if the human flea is unable to preserve its infecting power for so long a time as the rat flea.
W. F. H.

LAMBERT (L.). La peste à l'hôpital central indigène en 1931. [**Plague at the Central Native Hospital (Dakar) in 1931.**—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 671-672.

Out of the 247 plague patients admitted 128 had been vaccinated more than a month, 10 less than a month and 109 had not been vaccinated at all. The mortality among the vaccinated was 37.5 per cent. and among the non-vaccinated 52.2 per cent. All the patients were treated by bacteriophage.
W. F. H.

VAN DEN BERG (W. J. Roos) & Vos (J. J. Th.). Klinische en pathologisch-anatomische waarnemingen bij pestgevallen te Bandoeng. [**Clinical and Anatomico-Pathological Observations on Plague at Bandoeng.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Apr. 12 & 26. Vol. 72. Nos. 8 & 9. pp. 465-478; 531-562. With 2 text figs. & 14 figs. on 7 plates. [20 refs.]

This paper concerns 66 cases of plague which were seen in the hospital at Bandoeng in 1929 and 1930 (3 cases observed in 1931 are mentioned in an appendix). The fatality was 50, or 76 per cent. Those who recovered (16) all had been suffering from bubonic plague. The chances of recovery appeared to be somewhat better in men than in women and decidedly better (32.5 per cent. against 8 per cent.) in individuals from 10 to 40 years of age than in children and older people. There were 51 cases of bubonic plague, 2 of plague ulcers, 12 of septicaemic plague and 1 of primary pulmonary plague. For the detailed analysis of the clinical observations and for the numerous case reports, quoted in the text, the original paper should be consulted. The treatment applied was purely symptomatic.

The anatomico-pathological part of the article is founded upon the experience obtained in 38 complete post-mortem examinations. In doubtful cases the autopsy may be helpful in order to establish the diagnosis though the last word is with the bacteriologist. Like other pyogenic organisms the plague bacillus may cause local affections at the "porte d'entrée" (sometimes the lung), as well as metastatic affections of the lymphatic system or by the way of the blood current. Its predilection for the lymphatic system and the typical character of the recent plague bubo are more or less specific. The haemorrhagic type of adenitis is rarely found in other diseases.

In judging whether a bubo is primary or secondary (by haematogenic metastatic spread) the author largely depends upon the stage of inflammation of the gland coupled with his knowledge of the duration of the illness.
W. J. Bais.

VEDDER (A.). Rattepest aan boord van een stoomschip in de haven van Amsterdam. [**Rat Plague on a Steamer in Amsterdam.**—*Nederl. Tijdschr. v. Geneesk.* 1932. May 14. Vol. 76. No. 20. pp. 2339-2347. With 3 figs. on 1 plate. English summary.

There have been 8 previous occasions on which plague has been found in rats on board ships arriving in Amsterdam. The strain isolated from this, the ninth, case presented certain peculiarities, in particular

that it was little virulent for guineapigs. One of the difficulties in the case of the rat is to distinguish *Past. pestis* from *Past. pseudotuberculosis rodentium*. The distinction is made by the test of cultivation in litmus-salt-peptone water tubes containing 0.5, 0.25, 0.1 and 0.05 per cent. glucose. All the tubes are turned red with growth but, whereas in the case of the former organism they remain red, in the case of the latter the 0.05 per cent. tube turns blue again after some days. The resemblance of the different types of colony forms (F-, G-, D-form) in the case of the two organisms is also discussed. By the criterion laid down the organism found on this occasion was a true plague organism. Its lack of virulence may have been due to the fact that its type of colony was one of comparative non-virulence. *W. F. H.*

LEFROU (G.). Contribution au diagnostic *post-mortem* de la peste. Les cadavres pesteux à foie négatif à l'examen direct. [**Post-Mortem Diagnosis of Plague.**].—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 399-404.

The diagnosis was made within twelve hours of death and related to 323 cases, men, women and children suspected of plague. Of those who had palpable inguinal or axillary glands, 135 gave positive smears from both liver and gland, 26 positive liver and negative gland, 28 negative liver and positive gland, and 47 negative liver and negative gland, while of those without palpable glands 60 gave positive and 27 negative liver smears. The conclusions reached from the investigation are that:—(1) Simple needle puncture will not furnish, with certainty, smears that are positive; it is necessary to take a piece of the organ itself for the preparation of the smear. (2) Liver smears may be positive when gland smears are negative and *vice versa*; it is necessary to take smears from both if palpable glands, which are usually present in any case in the negro, are available. *W. F. H.*

OTTEN (L.). **The Problem of the Seasonal Prevalence of Plague.**—*Jl. Hygenc.* 1932. July. Vol. 32. No. 3. pp. 396-405. With 3 charts in text.

The seasonal prevalence of plague, with due regard to the existence of other possible factors, is due "almost exclusively to atmospheric conditions with their unmistakable influences on the flea. . . ." It has already been found that saturation deficiency affords a better correlation with plague periodicity than does relative humidity, after temperature has been taken into account. Fluctuations of temperature and humidity have a powerful influence upon flea prevalence and thus produce an effect, first upon the epizootic and then upon the epidemic. Saturation deficiency, however, will not wholly or satisfactorily explain seasonal fluctuation of plague. In Java there is a pronounced change of monsoons, but the temperature remains at a very uniform level. The author's researches go to show that it is the driest period of the year, that is to say in the third quarter, when increase of plague begins and that the peak is attained in the last months of the year. The wet monsoon lasts from November to April and the dry monsoon from May to October. By the second quarter of the year plague has reached its lowest point. In the mountainous parts of Java the flea index fluctuates closely with the seasonal course of plague, although it is not yet clear how relative humidity influences the development and viability of the flea in these regions. It is found moreover, that while there is

close correlation between the flea index and saturation deficiency, this is of an exactly opposite type to that which holds for British India.

W. F. H.

FONQUERNIE (J.). Sur deux cas de peste pulmonaire à longue évolution. [**Two Cases of Pneumonic Plague of Long Duration.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 176-177.

The rapidly fatal issue of pneumonic plague was already recognized by GUY DE CHAULIAC in the Avignon epidemic of 1348 when he said "Et isti moriebantur intra tres dies." The duration of 50 hospital cases now recorded by the author is, within 24 hours 22, 24 to 48 hours 18, and over 48 hours 12. The great majority of those living more than 48 hours were dead within 3 days but two cases lived for 7½ days and 10 days respectively.

W. F. H.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1932. Mar. Vol. 24. No. 3. pp. 438-499.—Enquête sur les résultats de la vaccination antipesteuse. Réponses au questionnaire: Egypte [pp. 441-6]; Inde Britannique [pp. 447-56, 457-8, 459-78, 479-89, 490-3, 494]; Italie [pp. 495-7]; Maroc [pp. 498-9]. [**Enquiry into the Results of Plague Vaccination by Questionary. Replies of Egypt, British India, Italy and Morocco.**]

The points investigated, set out in the form of questions, were :—

- A. (1) Method. Proportion of population vaccinated. Control population.
- (2) Vaccination performed at the beginning, end, middle epidemic, or interepidemic period.
- (3) Incidence upon the population at risk—isolated cases, numerous cases or dense foci.
- (4) Reality of the Vaccination.
- B. (1) Vaccine used. Composed of freshly isolated or old, very virulent or moderately virulent strains. Preparation—solid or liquid medium; temperature of sterilization; addition of antiseptics; menstruum; special characters.
- (2) Concentration of germs.
- C. (1) Number of injections and spacing.
- (2) Doses.
- (3) First appearance of immunity and its relation to the statistics of the vaccinated. Negative phase condition; duration of immunity after one or more injections.
- (4) Degree of reaction, local, regional and systemic. Correlation between reaction and immunity.
- D. Results.

The replies to these questions are given in greater or less detail by each of the four countries mentioned and will doubtless be analysed after all the replies have been published.

W. F. H.

FONQUERNIE (J.). Considérations sur un cas de longue incubation de peste pulmonaire. [**Long Incubation of Pneumonic Plague.**]—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 904-906.

A man, 66 years of age, who died in 8 hours from pneumonic plague in the quarantine station, had been removed from contact with a case of septicaemic plague 10 days before he showed any symptoms. Thus the incubation period is calculated to have been one of 10 days or longer.

W. F. H.

NAIDU (B. P. B.) & AVARI (C. R.). **Bacteriophage in the Treatment of Plague.**—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 737-748. [8 refs.]

A powerful plague bacteriophage obtained from a rat, was capable of lysing a 24-hour growth of *Past. pestis* in less than two hours. Trials of this 'phage were made both in experimentally infected animals and man. In neither case were the trials effective in preventing death. A combination of 'phage and an anti-plague serum "resulted in a lesser number of recoveries from plague than what followed the use of the serum alone."

W. F. H.

NAIDU (B. P. B.) & SATHE (R. G.). "Germanin" ("Bayer 205") in the Treatment of Plague.—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 749-759. [47 refs.]

No evidence of bactericidal action of "Germanin" *in vitro* could be obtained nor was it found to possess any curative value when tested upon experimentally infected rabbits.

W. F. H.

DE SMIDT (F. P. G.) **A Note on Laboratory Diagnosis of Plague Infections.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Apr. Vol. 9. No. 1. pp. 2-13.

The bacteriological, the microscopic and the macroscopic diagnosis of plague is described in some detail. In puncturing a bubo it is essential to obtain by aspiration gland substance and "not merely the oedematous tissue or fluid surrounding it." If suppuration of the bubo has taken place it may not be possible to find plague bacilli in the pus. If plague bacilli are contained in sputum they are usually present in very large numbers so as to leave no doubt about the diagnosis. In order to get with certainty characteristic bipolar staining in films the author recommends Gram staining after alcohol fixation.

W. F. H.

FRANCIS (Edward). **Duration of Viability and Virulence of *Bacillus pestis*.**—*Public Health Rep.* 1932. June 10. Vol. 47. No. 24. pp. 1287-1294.

The strain used was isolated from a California ground squirrel. Tests were applied for viability in the following cases:—No. 1 an agar culture which had remained sealed for 9 years at 10°C.; No. 2 an agar culture which was subcultured at 3-monthly intervals for 9 years with other stock cultures and stored at 10°C.; No. 3 the whole spleen of a plague guineapig kept at -15°C. for 7 years and No. 4 a culture isolated from that same guineapig suspended in glycerine, stored at -15°C. and tested at intervals. The results were that No. 1 was viable and fully virulent, No. 2 viable and non-virulent, No. 3 viable and fully virulent and No. 4 fully virulent for 14 months, slightly virulent for 2 years 7 months and dead at the end of 3 years.

W. F. H.

NAIDU (B. P. B.) & SATHE (R. G.). **The Comparative Value of Anti-Plague Bilivaccine and Haffkine's Plague Prophylactic.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 987-992.

The bilivaccine was administered, according to directions, orally while Haffkine's plague prophylactic vaccine was given subcutaneously

in the test animals (rabbits) in a dose of 4 cc., as recommended for man. As a result of these experiments on rabbits the authors found no protection conferred by the bilivaccine as against 100 per cent. protection given by the subcutaneously administered plague prophylactic vaccine.

W. F. H.

SCHÜTZE (Harry). **Studies in *B. pestis* Antigens: I. The Antigens and Immunity Reactions of *B. pestis*. II. The Antigenic Relationship of *B. pestis* and *B. pseudotuberculosis rodentium*. III. The Prophylactic Value of the Envelope and Somatic Antigens of *B. pestis*.**—*Brit. J. Experim. Path.* 1932. June. Vol. 13. No. 3. pp. 284–288. With 1 fig.; pp. 289–293. With 1 fig. [10 refs.]; pp. 293–298. With 5 figs.

I. At an incubator temperature of 37°C., but not at 20°C., gelatinous envelopes, which are demonstrable in Indian ink preparations, make their appearance round all plague bacilli. As these envelopes never develop round *Past. pseudotuberculosis rodentium*, the character is a diagnostic one. By heating at 60°C the gelatinous envelope can be dissolved and used as antigen. A suspension of culture grown at 26°C, killed at 60°C and centrifuged, provided a supernatant fluid rich in somatic substance. It was discovered that gelatinous substance was heat-labile, haptenized in 15 minutes and destroyed in 60 minutes at 100°C. The somatic substance is stable. These two substances were used to furnish antisera and were found to be distinct antigens.

II. The heat-stable somatic antigen of *Past. pestis* is also possessed by *Past. pseudotuberculosis rodentium* and is "the basal rough framework of the bacillus, which . . . is laid bare and comes into action in an agglutination test only when the organism loses its smooth specific somatic factor and becomes rough. . . ." *Past. pseudotuberculosis rodentium* is motile and possesses (1) flagellar antigen, (2) a somatic antigen, which may be regarded as smooth, type-specific, and (3) the common rough somatic antigen. In the view of the author *Past. pestis* possesses ordinarily only a rough somatic antigen and no smooth species-specific antigen.

III. Important investigations have been made on the basis of the previous findings into the efficacy of plague vaccines. It is shown that, no matter what the medium used, prophylactic potency is enhanced to the extent of 50 to 100 per cent. by incubation of cultures at 37°C instead of at 26°C. As the former temperature is that at which gelatinous envelopes are produced in greatest abundance, it is reasonable to suppose that the envelope is what is efficacious prophylactically, especially as heating for 15 minutes at 100°C, which haptenizes envelope substance, renders a plague vaccine useless. An additional advantage gained by incubation at 37°C. is that the resultant broth vaccine is not only more potent but less toxic. W. F. H.

COUVY (L.), LAMBERT (L.) & DUFOUR (V.). Le principe lytique transmissible, dit "bactériophage" du bacille d'Yersin. [**The Lytic Principle or Bacteriophage of Plague.**]—*Ann. Inst. Pasteur.* 1932. May. Vol. 48. No. 5. pp. 541–593. With 12 text figs. [33 refs.]

Great stress is laid upon the specificity of the plague bacteriophage which necessitates the use of the 'phage appropriate to the particular

organismal type. Virulent 'phages are obtained by cultivation on single organismal strains. As it is not possible to identify the organismal type before use of the 'phage it is obviously necessary to use as polyvalent a 'phage as possible for treatment. Very encouraging results and comparatively little in the way of complication have been obtained in the treatment of plague. As patients do not appear for some days after attack a preliminary de-sensitization, by the subcutaneous injection of their own blood (autohaemotherapy), has been the routine practice in order to overcome the effect of the antiphage, which has presumably developed by that time. In bubonic cases the bacteriophage is administered subcutaneously and into the bubo in doses of 2 to 3 cc. on the first day and again on the second day, subcutaneously only on the third day. In septicæmic plague 3 cc. have been given intravenously in the course of 24 hours, repeated if necessary in 3 days time.

W. F. H.

COUVY (L.). Sur le bactériophage du bacille de Yersin. [**Plague Bacteriophage.**].—*C. R. Soc. Biol.* 1932. May 6. Vol. 109. No. 15. pp. 1344-1346.

The specific action of plague bacteriophage, isolated from the stools of convalescents, is illustrated by means of examples. A given 'phage lysed No. 1 strain in 3 hours and No. 2 in 3½ hours. It was cultivated in 4 passages with No. 2 strain and was exalted in virulence to the extent of being able to lyse this strain completely in 1½ hours: it now took 5 hours, however, to lyse No. 1 strain and the lysis was followed by the development of secondary colonies. In another case a 'phage, which was lytic for several strains, lost by cultivation with one of these all its lytic power for the others. Still another experiment showed that a 'phage whose virulence had been exalted for one strain remained inactive towards strains which had originally been resistant to its action. These resistant strains, nevertheless, are not necessarily insensitive to 'phage action but require to be cultivated with their own specific 'phage in order to be lysed. The author concludes that the specific character of a bacteriophage has no relation to smoothness or roughness of colonies nor to S and R characters of the organism. The bacteriophage is strictly specific *in vitro* and if an apparent polyvalent action is shown it will disappear by cultivation with a single organismal strain. It is contended, therefore, that strains of plague bacillus are not to be regarded as identical in their reaction to 'phage unless both are still lysed in the same degree after cultivation of the 'phage in serial passage with one strain only. The bearing of these facts on the therapeutic use of bacteriophage has to some extent been confirmed in practice. Obviously, a 'phage in which a number of types is represented will be more likely to be active than one with only a single type, however potent it may be. The therapeutic action of the pestiphage is a function of the specificity of the lytic principle used.

W. F. H.

COUVY (L.). Le bactériophage du bacille de Yersin, son comportement *in vivo*. [**Plague Bacteriophage in Vivo.**].—*C. R. Soc. Biol.* 1932. May 13. Vol. 110. pp. 38-41.

In the first place the author affirms the perfect safety of treatment of plague by bacteriophage. Even intravenous administration gives

rise at most to slight shock and that but rarely. Its effect is rapid. Delirium quickly subsides ; on the following day pain has disappeared and in a few days the periadenitis is dispersed. If the bubo suppurates healing is obtained in 4 to 8 days after incision. Plague bacilli, which are abundant in gland juice obtained by puncture, are found to be in a state of lysis 2 hours after injection of 'phage. Some striking cases of bubonic plague have been cured in a few hours. Again, in cases of plague in which death has occurred in spite of treatment, it was not possible to obtain cultures of the plague bacillus from any of the organs *post mortem*. W. F. H.

PONS (R.). Le bactériophage anti-pestueux *in vivo*. [**Plague Bacteriophage in Vivo.**].—*C. R. Soc. Biol.* 1932. May 27. Vol. 110. No. 18. pp. 184–186.

Some of the findings of the author are that :—(1) Bacteriophage subcutaneously injected is rapidly generalized and produces in twenty-four hours a lysis of germs everywhere which, however, may not be complete. (2) In grave septicaemias injection of a lytic principle precipitates a toxæmia. (3) As long as lytic principle is demonstrable, cultures from either bubo or blood remain negative. (4) If during forty-eight hours the patient receives no bacteriophage, cultures from bubo or blood become positive if the illness has a fatal issue and remain negative in cases of recovery. W. F. H.

PONS (R.). Le bactériophage anti-pestueux *in vivo* chez l'homme, chez le cobaye et chez la souris. [**Pestiphage in Vivo in Man and Laboratory Animals.**].—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 437–447.

After injection of bacteriophage the blood and fluid of buboes give no culture of plague ; the bacteriophage masks the infection. Therapeutically bacteriophage in somewhat doubtful instances appears to check the development of the disease. In the great majority of cases, however, and under the conditions of experimentation here employed, the bacteriophage was devoid of therapeutic action. No parallelism could be found between persistence of bacteriophage in the organism and the progress of infection. The infection might be fatal even though bacteriophage was demonstrable during the whole course of the disease and even at death. W. F. H.

ADVIER (M.). Existence d'un principe lysant le bacille de Yersin dans le sang d'une convalescente de peste. [**Plague Bacteriophage in the Blood.**].—*C. R. Acad. Sci.* 1932. Apr. 18. Vol. 194. No. 16. pp. 1397–1399.

PONS (R.) & DURIEUX (C.). Existence dans le bubon d'un pestueux convalescent d'un agent de la lyse transmissible, en dehors de sa présence dans l'intestin. [**Plague Bacteriophage in Bubonic Fluid.**].—*Ibid.* pp. 1399–1400.

A blood culture and the juice from an enlarged groin gland gave a growth of *Pasteurella pestis*, which subsequently dissolved away. An investigation of this phenomenon showed that it was due to the presence of the specific transmissible lytic principle for plague bacilli, and furnished proof that this principle could be found in situations other than the faeces. W. F. H.

ADVIER (Marcel). Caractères d'un principe lysant le bacille pesteux retiré du sang humain. [A Lytic Principle for *P. pestis* in Human Blood.]—*C.R. Soc. Biol.* 1932. May 27. Vol. 110. No. 18. pp. 161–163.

A bouillon blood culture from a plague convalescent, who had recovered without treatment, furnished a growth in six days which then disappeared in some hours by lysis. At the time when the growth appeared subcultures were made into bouillon and into agar. The bouillon cultures remained absolutely clear and successive passages were made, after a week's interval, to other bouillon tubes. These remained perfectly clear, but the lytic principle had nevertheless been transmitted in the subcultures and without loss of activity. It could lyse a suspension of plague bacilli in twelve hours and was perfectly specific. The subculture, which had been made on to agar, showed only a few isolated colonies of very slow growth. When these colonies were transferred to bouillon it remained clear, but showed high lytic power, strictly specific and transmissible. W. F. H.

SUGINO (Tameji). On the Bacteriophage against the Plague Bacillus.—*Kitasato Arch. Experim. Med.* 1932. Feb. Vol. 9. No. 1. pp. 72–81.

A plague bacteriophage was obtained from three laboratory strains of the bacillus. It was found to have a high degree of specificity, for it proved inactive even to allied organisms of the *pasteurella* group. Resistant strains to the bacteriophage were also developed.

W. F. H.

BOKALO (A.), WEDISCHTSCHEW (S.), SABININ (A.), JEGOROW (A.) & GRIKUROW (W.). Ueber Symbiose des *B. pestis* und des *B. pseudotuberculosis* rod. Pfeifferi mit Sarzinen. [Symbiosis of *Past. pestis* and *Pseudotuberculosis rodentium* with *Sarcinae*.]—*Zent. f. Bakt.* I. Abt. Orig. 1932. July 6. Vol. 125. No. 1/2. pp. 32–37. With 2 figs.

Weak suspensions of *Past. pestis* do not grow when sown upon agar plates, in which respect they differ from *Past. pseudotuberculosis rodentium*. If, however, citron-yellow, white or rose-yellow *sarcinae* be sown with the plague bacillus it is stimulated to grow.

W. F. H.

CHINESE MEDICAL JOURNAL. 1932. Apr. Vol. 46. No. 4. pp. 429–435.—
Plague in Shansi and Shensi.

CHOLERA.

WU LIEN-TEH. **Report on the Cholera Outbreak of Shanghai 1931.**—*Reports National Quarantine Service Ser. II—1931.* pp. 70–86. With 9 text figs.

Shanghai appears to have had, during the past ten years, at least an outbreak of cholera every year. With better notification and laboratory diagnosis since 1930 no true case of cholera has been missed. The population of Shanghai is over 3,100,000. In the outbreak reported 482 cases occurred between the dates 8th August and 23rd October. The epidemic was of a very diffusely distributed character. It is at least noteworthy that not one of the 482 cases had received anti-cholera vaccination and that among 761,279 persons inoculated no instance of cholera infection could be traced. *W. F. Harvey.*

LOPEZ RIZAL (L.), SIAN (Jose) & PUNSALANG (Jose V.). **Cholera Epidemic in Bantayan.**—*Monthly Bull. Philippine Health Serv.* 1931. Oct. Vol. 11. No. 10. pp. 533–551. With 1 folding chart.

This investigation of the serious epidemic in Bantayan in 1930 has led the authors to the findings that :—(1) Epidemics of cholera have been occurring in the town since 1902, as shown by records. (2) The number of carriers among contacts was 1·61 per cent. as compared with 0·49 per cent. in the general population. (3) The recovery rate among the vaccinated cases was 61·39 per cent. and for the unvaccinated 45·45 per cent. (4) The endemicity of the infection is due to carriers. *W. F. H.*

DUGUET. Les épidémies de choléra au Hedjaz. [**The Epidemics of Cholera in the Hedjaz.**].—*Rev. Prat. Malad. des Pays Chauds.* 1931. Nov. 10th Year. Vol. 11. No. 11. pp. 492–495.

"Cholera has always been the scourge of pilgrimages. . . . and . . . the Hedjaz is the post of relay of cholera in its progress from the Far East towards the West." There have been twenty-seven Hedjaz epidemics in the last eighty-one years. Cholera is as frequent in winter as in summer and would seem to be endemic there, either because of continuous introduction from external sources or as a result of recrudescence at the time of pilgrimage. On the return journey from Mecca pilgrims making their way back to Egypt and the Mediterranean are isolated at Tor, where they undergo disinfection and a quarantine detention for three to five days. This station, therefore, to which cholera has been carried fulfils the function of a barrage. Much work remains to be done, and that by the bacteriologist, before the question whether imported cholera is one of case or carrier can be settled. *W. F. H.*

DE VOGEL (W. Th.). Sur l'identification du vibrion cholérique. [**Identification of the Cholera Vibrio.**].—*Bull. Office Internat. d'Hyg. Publique.* 1932. Feb. Vol. 24. No. 2. pp. 262–270. With 3 coloured figs. on 2 plates.

The isolation at El Tor by DOORENBOS in 1930 and 1931 of vibrios which were agglutinable by anticholera serum but were strongly

haemolytic, has raised anew the question which arose in 1905 regarding the vibrio El Tor. The circumstances are identical. There was no cholera among the pilgrims. The regulations, however, which apply in the event of the outbreak of cholera, were put into force and have elicited strong protest. The position is very much as it was originally, except for the fact demonstrated by VAN LOGHEM, that while the El Tor vibrio is haemolytic both have the power of digesting haemoglobin and producing a transparent zone when grown on a blood-agar medium. The opinion is expressed that this culture reaction is a significant one and differentiates El Tor and saprophytic vibrios from the cholera vibrio. It is very desirable that the position of the El Tor vibrio should be definitely settled.

W. F. H.

VAN LOGHEM (J. J.). De El Tor-vibrio. [**The El Tor Vibrio.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. Apr. 23. Vol. 76. No. 17. pp. 1939–1948. With 1 coloured plate. [22 refs.] English summary (5 lines). [Summary appears also in *Bulletin of Hygiene.*]

The author reaffirms the necessity for distinguishing, in the case of vibrios, between haemodigestion and haemolysis and between exo- and endohaemolysin. The erythrocytes of the guineapig and the rabbit are too sensitive for these tests. Sheep or goats' blood should be used. If a true cholera vibrio at a late stage of growth appears to haemolyse blood this is due to autolysis of the vibrios and the action of endohaemolysin. A true haemolysin is a product of living bacteria: it acts early and not late in growth, is thermolabile and antigenic. These are characters which differentiate it from the endohaemolysin. That the cholera vibrio has digestive action is shown by its ability to digest casein and to liquefy gelatin. It can, naturally, also digest blood and it is this property which gives rise to the greenish zone around a stroke blood-agar culture. Spectroscopic investigation shows the disappearance of blood pigment with digestion in the transparent zone around a cholera growth. In the case of the transparency brought about by haemolysis the blood pigment is still present. The bearing of these facts upon the controversy over the identity of the El Tor and the cholera vibrios, which has been raised again by the isolation at Tor of the same type of vibrio from pilgrims not suffering from cholera, is this:—

1. The true cholera vibrio is haemodigestive but not haemolytic.
2. The El Tor vibrio is both haemodigestive and haemolytic.
3. Both these vibrios are morphologically and serologically identical.

W. F. H.

VAN LOGHEM (J. J.). Der El Tor-Vibrio. [**The El Tor Vibrio.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. June 23. Vol. 114. No. 1. pp. 20–30. [20 refs.]

The whole El Tor vibrio question may be said to have been raised anew with the discovery 25 years later of the same organisms, under the same conditions of a cholera-free pilgrimage and in the same place. It might be said that the question is now a purely academic one, but it is not so, for on the official diagnosis of cholera during this pilgrimage will depend the verdict as to infected ports and the quarantine and disinfection of large groups of persons. Van Loghem's own contribution to the subject, which is not a recent one, was the distinction

which he drew between haemodigestion as a peculiarity of the cholera vibrio and the marked haemolytic action of the El Tor vibrio. It is now, as he says, all-important to settle whether (1) a non-haemolytic strain of vibrio can become haemolytic and (2) a haemolytic strain can be the cause of cholera.

W. F. H.

DOORENBOS (W.). Étude sur la symbiose du vibron cholérique avec le bactériophage. Reproduction expérimentale des variations des caractères biologiques des vibrios cholérigènes. [**Symbiosis of the Cholera Vibrio with the Bacteriophage. Experimental Production of all the Possible Variants of the Cholera Vibrio.**]—*Ann. Inst. Pasteur*. 1932. Apr. Vol. 48. No. 4. pp. 457-469.

With the appearance of this paper the long drawn out controversy whether haemolytic El Tor vibrios are true cholera vibrios, bids fair to come to an end. This may be best explained by means of the conclusion arrived at, which is that "it is possible by the agency of the bacteriophage of d'Herelle to transform *in vitro* the agglutinable vibrio into a non-agglutinable, the non-haemolytic into the haemolytic, the vibrio giving a feeble indole reaction into an indole-producer and to isolate from one and the same strain of vibrio organisms which are agglutinable and organisms which are non-agglutinable, haemolytic and non-haemolytic."

It is the presence of bacteriophage in the cultures that is the chief cause of modification of the distinctive characters by which the true cholera vibrio is recognized. In fact, the El Tor vibrio is a cholera vibrio contaminated with bacteriophage. The former is an endemic and the latter the epidemic type of cholera vibrio.

W. F. H.

KIRIBAYASHI (Shigeru) & AIDA (Toshiro). Experiments with "Yatren 105" on Cholera-Carriers.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1932. May. Vol. 31. No. 5 (326). [In Japanese. English summary p. 53.]

Yatren 105 of strength 0.1 per cent. in distilled water and 0.5 per cent. in normal salt solution and peptone water killed cholera vibrios within 1 hour, 1 hour and 12 hours respectively. Given to seven carriers in doses of 1.5 to 2.1 gm. per day *per os* it caused disappearance of the vibrios within 2 to 5 days.

W. F. H.

DE RAYMOND (A.). Note thérapeutique sur le traitement des diarrhées cholériformes et éventuellement du choléra. [**Treatment of Choleraform Diarrhoea and of Cholera.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 196-199.

The therapeutic method here advocated is one of intravenous injection of very hypertonic solutions of chloride. It is based on the idea that what is required is not merely the temporary restoration of the chlorides lost in such a disease as cholera, but the arrest of their withdrawal from the tissues. The method has been used with success in intestinal occlusion and consists in intravenous injection of a combined solution of 30 per cent. sod. chloride and 2 per cent. gonacrine daily. The amounts used are two injections daily of 10 to 20 cc. of the salt solution and one injection of 5 cc. gonacrine. Gonacrine is added

for its action on the toxæmia of infection. Altogether 22 cases of choleric form diarrhoea were treated with the death of only 2 instead of the usual 60 to 80 per cent.

W. F. H.

RICOU & TRAN-VAN-TAM. Premier essai de traitement du choléra en Indochine par l'immuno-transfusion sanguine. [**First Attempts at the Treatment of Cholera by Immuno-Transfusion of Blood.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. Nov.-Dec. Vol. 9. No. 10. pp. 795-799. With 1 folding chart.

The type of cholera case which is commonly received into hospital with imperceptible pulse, a temperature in the mouth of 86°F., black and viscid incoagulable blood, retracted eyeballs, and glazed cornea and not a drop of urine passed in twenty-four hours is not going to be saved by any form of therapeutic intervention. And so it was in the cases of immuno-transfusion here recorded. The method of treatment is interesting, although so far ineffective. Healthy group-4 blood donors with no taint of syphilis, tubercle or leprosy were chosen and received 4 injections at 6 days interval of cholera vaccine subcutaneously in the doses 1, 2, 3 and 4 cc. They were ready to supply blood after the 2nd injection and received a dose of 1 cc. cholera vaccine intramuscularly before each transfusion. The transfusion procedure used was that of glucose serum and amounts of 150 to 200 cc. were administered daily without any mishap.

W. F. H.

PANDIT (C. G.) & RAO (R. Sanjiva). **A Note on the Type of Cholera Bacteriophage Isolated from Cases during a Small Epidemic of Cholera in Madras.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1019-1021.

A smooth strain of cholera vibrio was used, which was uncontaminated with 'phage. From this strain a rough variant was obtained by ordinary dissociation methods. The three cholera 'phage types A B and C were made to act upon the smooth strain to give secondary colonies and these secondary colonies were tested for antigenic structure along with the original smooth strain and its rough variant. The appropriate sera were obtained by immunization of rabbits. Somatic antigen showed the main change. This antigen was considerably diminished in the case of secondary A, but it persisted in varying amounts with secondaries B and C. The above gradation was noted in the case of flagellar antigen also. The power to provoke normal agglutinins was found to be proportional to the amount of somatic antigen present.

W. F. H.

PANDIT (C. G.) & RAO (R. Sanjiva). **A Note on the Antigenic Structure of Secondary Cultures obtained with the Three Types of Cholera 'Phages and a Strain of Cholera Vibrio.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1023-1028.

This is an account of the isolation of an "A" type of cholera bacteriophage, capable of lysing a representative strain of each of the four groups of Indian cholera vibrios at present known. It is contended by the authors that this 'phage A was not the result of natural propagation of that 'phage contained in a mixture of A, B and C types which had been administered in the Infectious Diseases Hospital four months previously.

W. F. H.

PASRICHA (C. L.), DE MONTE (A. J.) & GUPTA (S. K.). **A Preliminary Note on New Types of Cholera 'Phage—Types D. & E.—Indian Med. Gaz.** 1932. May. Vol. 67. No. 5. pp. 262–264. With 5 figs. (2 on 1 plate).

The isolation from water of a 'phage "W" to cholera-like vibrios, the secondary growths of which were lysable by true cholera 'phage, caused the authors to search for new types of cholera 'phage other than the A, B and C types already differentiated. These new types, it was supposed, would link up the A, B and C types with the newly isolated bacteriophage. The authors possessed filtrates of cholera stools and water samples to the number of 550 with which to try out this hypothesis. A type D has now been definitely isolated and "evidence is presented to show the existence of one other or perhaps two other (E and F) types of cholera 'phage." The D 'phage shows what is called reciprocal action. This is equivalent to saying that type A cholera 'phage lyses the secondary cultures of the types B, C and D cholera 'phage; B 'phage those of A, C and D; C 'phage those of A, B and D; and D 'phage those of A, B and C.

W. F. H.

MESNARD (J.) & GENEVRAY (J.). Contribution à l'étude du vibron cholérique. [**A Variant of the Cholera Vibrio.**—*Arch. Insts. Pasteur d'Indochine*. 1931. Oct. No. 14. pp. 51–62. With 1 coloured plate.

Recently isolated strains of *Vibrio cholerae*, which were being used for preparation of vaccine showed alongside the typical moist, bluish, translucent, colonies with well defined margin, other colonies which were smaller, dry, white, opaque with more or less regular margins and a wrinkled surface. These were not contaminations, nor are they considered to be even a mutation of the cholera vibrio. They are variants with the same characters as the normal cholera but differing in degree. The characters of the wrinkled colony vibrios, as contrasted with normal colonies are:—slower in the digestion of gelatin and coagulated serum, more vigorous in fermentation of glucose and saccharose, less proteolytic and less indologenic, much more haemolytic, less pathogenic and less agglutinogenic. After intraperitoneal injection of guineapigs with vibrios from wrinkled colonies, the cultures made from the peritoneal fluid showed mostly colonies of normal type.

W. F. H.

PASRICHA (C. L.), DE MONTE (A. J.) & GUPTA (S. K.). **Mutation of Cholera Vibrios. (The Characters of the Population of a Freshly-Isolated Cholera Colony, with a Note on Some Colony Variants of Cholera and Cholera-like Vibrios.)—Indian Med. Gaz.** 1932. Feb. Vol. 67. No. 2. pp. 64–69. With 3 text figs.

Bile-salt agar medium was used to obtain the variant dissociated colonies. The tests applied were, microscopic examination of colonies, Millon's reaction for roughness and smoothness, agglutinability with standard cholera serum and lysability by the 3 types of bacteriophage. With repeated cultivation and selection, colonies were obtained differing from the parent colony in morphological, serological and cultural

characters. Inagglutinable and partially agglutinable colonies, for example, could be obtained from a good agglutinating colony. Some colonies lost likewise their agglutinogenic power.

W. F. H.

RUSSELL (A. J. H.). Un essai d'application du bactériophage à la prévention du choléra. [**Trial of Bacteriophage in the Prevention of Cholera.**]¹—*Bull. Office Internat. d'Hyg. Publique.* 1932. Feb. Vol. 24. No. 2. pp. 271–273. With 1 text fig.

In this communication regarding a still unfinished trial of bacteriophage a graph is given of the epidemic incidence of cholera in two noted centres, one in which the treatment was afforded and one in which it was not. The result is significantly in favour of bacteriophage, but two years are still to run before publication of results, so as to exclude the possibility that the cessation of cholera was due to simple and temporary decrease.

The use of the mixed dysentery-cholera bacteriophage for all cases of diarrhoea and dysentery at the quarantine camp of El Tor is recommended and evidently the recommendation is being carried into practice.

W. F. H.

MADRAS PRESIDENCY. REPORT OF THE DIRECTOR OF PUBLIC HEALTH, MADRAS, FOR 1930. pp. 12–18. With 1 map & 2 graphs.—**Cholera.**

A considerable sum of money was voted by the Madras Government to test the protective value of bili-vaccine against cholera. The great advantages of this vaccine are that it does not require to be administered by a medical man and that being given orally, it is more popular than subcutaneous vaccine. The chief difficulty in connexion with its use is that it must be given on three successive days and before any food is taken. It is unfortunate for the trial that the cholera epidemic was exceptionally mild and that several villages where no vaccine was administered also escaped infection. The results cannot be looked on as final and conclusive.

W. F. H.

NGUYEN-VAN-KHAI. Contribution à l'étude de la prophylaxie du choléra par la vaccination anticholérique. (Résultats constatés de 1926 à 1930 dans la province de Tan-An.) [**Results of Prophylactic Vaccination against Cholera.**]¹—*Bull. Soc. Méd.-Chirurg. Indochine.* 1932. Feb.-Mar. Vol. 10. No. 2. pp. 175–186.

The method of vaccination used was a single dose of 3 cc. where it was difficult to recall the persons vaccinated for a second dose. It is considered that at least 48 to 72 hours are required before immunity is established and that 5 to 7 days are necessary before it can be taken as certain. In the absence of any other efficacious method anti-cholera vaccination is regarded as one of the best measures available against cholera. The yearly vaccinations are tabulated.

W. F. H.

MALARIA.

BARBER (Marshall A.), RICE (Justus B.) & BROWN (James Y.). **Malaria Studies on the Firestone Rubber Plantation in Liberia, West Africa.**—*Amer. J. Hyg.* 1932. May. Vol. 15. No. 3. pp. 601-633. With 1 plan & 2 figs. [11 refs.]

This experiment was carried out on small groups of labourers isolated in new clearings in the jungle. Anopheline density was very high, about 4 per cent. were infected, and the human parasite rate was 80 per cent. The usual anti-mosquito measures, by draining and the like, were impracticable, and therefore the effect of plasmoquine was tried, each person being given a dose of one centigram twice a week. A great fall in the sporozoite rate of the local anopheles followed this treatment, with no corresponding fall in the control camps. In the most isolated group under treatment, no mosquitoes infected with sporozoites were found among 1,478 dissected over a period of 22 days. A striking feature was the rapid rise in the oöcyst rate which occurred 14 days after the plasmoquine had been discontinued. Through natural or acquired resistance the labourers were comparatively free from severe illness. A more balanced diet would probably lower the parasite rate and diminish sickness from all causes. "To eradicate malaria from any large portion of such a plantation would be next to impossible." If treatment with plasmoquine is to be successful, "the group to be treated should be more or less isolated from non-treated groups, and should be amenable to treatment." (See also this volume, p. 359.) *W. Fletcher.*

SERGEANT (Etienne). Les épidémies de paludisme et la météorologie en Algérie. [**Epidemic Malaria and Meteorology in Algeria.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 133-136. With 2 graphs.

Epidemics of malaria have occurred every 12 years since 1902. The curve showing the yearly rainfall between November and June, and the curve of the sunspots' area, follow, to a certain extent, the same line as the malaria curve. The most important cause of an epidemic in the summer is heavy rain and flooding in the spring.

W. F.

- i. DE FEYTER (C.). Résultats des recherches des indices splénique et hématologique chez les enfants indigènes de Chinkolobwe (octobre 1931). [**Splenic and Parasitic Indices of Native Children at Chinkolobwe.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 225-226.
- ii. ESTAS. Recherche des index splénique, gamétien et malarien sur la population infantile des camps de Jadotville en octobre 1931. [**Splenic and Gametocyte Indices of Children at Jadotville.**]—*Ibid.* pp. 227-228.
- iii. REYNTJENS (Paul). La malaria chez la population infantile du camp indigène de Lubumbashi en novembre 1931. [**Malaria among Native Children at Lubumbashi.**]—*Ibid.* pp. 229-239.

i. In 100 children between the ages of 2 and 10, the splenic index was 56, the parasite index 82, and the gametocyte index 42.

ii.		0-2 yrs.	2-10 yrs.	10-15 yrs.
	Total.	234	310	241
	Splenic Index ...	24	41	16
	Parasite Index ...	82	98	92
	Gametocyte Index ...	41	79	44

iii. Among infants 3 months old, 19.5 per cent. were infected. At two years the maximum of 86.6 is reached. In places where the maximum degree of infection is reached very early one concludes that the degree of endemicity is very high ; where the maximum is reached at a later age, the endemicity is lower. W. F.

RASMERITZA (E.). **Malaria in Roumania.**—*Riv. di Malarologia*. 1932. Vol. 11. No. 1. 12 pp.

Malaria has been endemic along the Danube and its affluents for hundreds of years. An experimental survey was begun by CANTACUZENE in 1904, and prophylactic quinine was given in nine rural areas. Only 0.09 per cent. of the treated persons suffered from malaria, but 11.4 per cent. of the untreated. All work was interrupted by the war, and malaria greatly increased. Malaria control at the present time is carried on by the Ministry of Public Health through some 1,200 officers. The technical work is in charge of a special commission composed of 13 members, including the three professors of hygiene. The treatment of carriers is given each year between January and April, when the new generation of anopheles appears ; the health officers locate and treat the acute cases ; free distribution of quinine was begun in 1923 ; quinine, arsenic and iron are prepared in the laboratory of the Ministry of Public Health ; blood and spleen examinations are compulsory and are made by the health officer of each area. " Both the incidence and gravity of the disease have decreased. . . . The effect is slight, however . . . quinine control of the disease is expensive, and is not a definitive measure." W. F.

SARATHY (M. K. P.). **Observations on Malaria in Puri District, Orissa.**—*Indian Med. Gaz.* 1932. May. Vol. 67. No. 5. pp. 254-260. With 2 charts & 1 map.

There is much malaria on the shores of Chilka Lake, the large inland sea of Orissa which is connected with the Bay of Bengal. *A. fuliginosus* is the prominent species in the area, and was the only anopheles found infected by the author. It breeds in the paddy fields. W. F.

WATSON (Malcolm). **Studies in the Parasitology of Malaria in the Federated Malay States between 1900-1912.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1209-1224. With 1 chart. [15 refs.]

KNOWLES and SENIOR-WHITE stated in their " Studies in the Parasitology of Malaria " (this *Bulletin*, 1931, Vol. 28, p. 612) that the parasitological aspects of malaria appeared to have been almost completely ignored in the F.M.S. The author quotes numerous records from annual reports and local medical publications to refute this accusation. An interesting suggestion is that anti-malaria sanitation may alter the relative proportions of the three species of parasites. Between the years 1907 and 1910, among 4,430 cases

examined in Singapore, 75 per cent. were subtertian, 16 simple tertian, and 5.4 quartan. Anti-malaria work was begun in 1911, and the results were excellent. The relative proportions of the different species among 5,284 cases, examined in 1915-1928 were: subtertian 40 per cent., simple tertian 57, quartan 2. W. F.

MOOIJ (W.). De malariabestrijding te Tanahmerah, Bovendigoel van 1 Maart 1930 tot 1 Maart 1931. [The Malaria Campaign at Tanahmerah, Bovendigoel, from March 1, 1930 till March 1, 1931.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. Jan 15. Vol. 72. No. 2. pp. 66-82. With 4 charts & 1 plan.

Tanahmerah (Dutch New Guinea) is a place of exile for political convicts. The malaria rate has risen since 1927, subtertian being most prevalent. The highest rate regularly occurred during the rainy season. *A. punctulatus*, var. *moluccensis* and *A. bancrofti* have been recognized as the vectors. The first was found breeding in open pools and drains and in shallow spots on the banks of the river and various brooklets. The breeding places of *A. bancrofti* were unknown.

The author divides the period of his activity into three parts:—

(1) From March till the end of June 1930. This was a rainy season. Yet the malaria morbidity, especially the subtertian rate, showed a marked drop, which in view of the experience in previous years can only be ascribed to the systematic quinine and plasmoquine prophylaxis, which is described in detail.

(2) The dry season from the beginning of July till the end of November 1930, was as such favourable for the malaria campaign. The influence of measures taken during this time (quinine and plasmoquine prophylaxis and oiling) cannot be estimated.

(3) From the beginning of December 1930 till the end of February 1931, a rainy season again, the malaria rate was much lower than could be expected in view of previous experience, which must be ascribed to the systematic antimalarial campaign. The influence of the completion of the draining system before the beginning of this period must also be taken into account.

The breeding places of *A. bancrofti* have now been discovered, being shaded, shallow parts of the river and various small currents in the jungle round the camp. *A. bancrofti* having pronounced anthropophilic habits the imagoes from long distances may be attracted by human settlements. In view of the inaccessibility of the breeding places their treatment appears impracticable. W. J. Bias.

SOUTHERN MEDICAL JOURNAL. 1932. May & June. Vol. 25. Nos. 5 & 6. pp. 521-551; 642-667. With 1 fig. & 1 map. [55 refs.]—**Symposium on Malaria, Part 1.** [8 papers.] **Part 2.** [7 papers.]

This symposium comprises papers read before the National Malaria Committee at New Orleans in November 1931. The chairman, Dr. S. S. COOK, spoke of malaria in Haiti, where the people lived as did their primitive African ancestors until the National Public Health Service was created in 1919; since then much has been accomplished, but malaria cannot be satisfactorily controlled under existing economic and political conditions. *A. albimanus* is the vector, and its larvae can be found below 2,500 feet in almost every kind of water deposit. Dr. C. C. HOFFMANN read a paper on malaria in Mexico with special

reference to *A. pseudopunctipennis*. Along the coast, *A. crucians* breeds in the brackish water of the mangrove swamps. *A. albimanus* is found along the rivers, from their mouths up to about 1,200 feet. *A. quadrimaculatus* occurs in the northern part of the country, both on the coast and in the interior. In the high arid plateau, *A. pseudopunctipennis* is the carrier. The only rivers of this region rise in the high mountains, and on reaching the hot plains they sink underground. Very clear waters rise in the beds of these rivers; they run for about a hundred yards, and then sink under the ground again; sometimes the springs form small pools. The anopheles breed in this water, and also in fountains, wells and tanks in the towns. In the valley of Mexico City, at an altitude of 7,200 feet, both *A. quadrimaculatus* and *A. pseudopunctipennis* are present.

Dr. G. H. BRADLEY reported his observations on the breeding requirements of anopheles in Louisiana. The abundance of larvae was not greatly affected by variations in the mean summer temperature. A certain amount of floating algae was necessary to protect them from the top water minnows, but too much prevented their breeding. No consistent differences were found between the plankton of breeding and non-breeding waters. The hydrogen-ion concentration of the waters containing larvae did not differ from that of those which contained none. The examination of gut contents did not throw much light on the matter.

Dr. W. KRAUSS reported on the analysis of 8,354 cases of therapeutic malaria inoculation in 68 institutions. The percentage of deaths was 5.38. The object of the study was to determine the reason for the high death rates. He urged the importance of a perfect hospital organization and a better knowledge of malaria. Dr. Bruce MAYNE preferred infection by means of mosquitoes to the inoculation of blood, and instanced fatalities due to blood being taken from a donor with a latent septicaemic infection in one case and, in another, to the donor having an undetected infection with subtertian parasites. He keeps his mosquitoes at about 76°F. while sporozoites are developing, and subsequently at 38° to 40°F. They are shipped, when required, in a portable refrigerator at 38°F. The sporogonic cycle is checked below 60°F., and the gametocytes taken with the host's blood either fail to exflagellate or gametogenesis is rendered innocuous, but low temperatures have no ill effect when the sporozoite stage has been reached.

Drs. H. C. CLARK and W. H. W. KOMP described observations made in some rural villages of the Republic of Panama. "Measures in malaria control seldom include the treatment of that vast number of rural people who really form most of the seed bed of malaria." Practically the whole population was infected, and they propose to inaugurate mass treatment with quinine and plasmoquine which, to be successful, must be under thorough discipline.

Dr. M. A. BARBER spoke of malaria in West Africa (see this volume p. 331). By means of oil and Paris green, he and a colleague controlled the breeding of anopheles in an area with a radius of half-a-mile round the Rockefeller yellow fever laboratory at Yaba, near Lagos, and they extended their operations about one mile to windward, but the malaria danger was not materially reduced, because anopheles came in from outside the protected area. "Malaria control work in West Africa must take into account a wide dispersion range of *costalis*. . . Screening is not likely to become general in West Africa. Few white people except Americans use it extensively."

Dr. E. C. FAUST stated that while satisfactory decreases had occurred in the malaria mortality rate in some places, there were still extensive areas where the rate was essentially the same as it was 10 years ago. Dr. F. L. HOFFMAN considered that progress was being made gradually. His paper contained several interesting tables, one of which is reproduced here.

Malaria Death Rates in Different Localities, 1919-1929.

Rates per 100,000 estimated population.

India.

Year	Calcutta.	Ahmedabad	Bangalore	Bombay	Bareilly
1919 ...	132.5	567.7	55.5	23.1	—
1920 ...	143.9	875.2	74.4	26.9	—
1921 ...	133.7	839.4	60.5	45.5	25.2
1922 ...	118.9	564.0	66.4	40.4	102.4
1923 ...	117.8	410.7	90.8	33.0	89.8
1924 ...	145.0	595.5	39.5	39.4	95.7
1925 ...	186.7	480.7	47.1	46.1	88.9
1926 ...	155.3	986.0	18.5	49.6	93.1
1927 ...	135.5	1007.9	13.5	28.1	167.8
1928 ...	124.9	1071.2	6.7	22.7	161.9
1929 ...	86.1	1440.5	5.9	16.6	130.1

Year	Kingston, Jamaica	Trinidad & Tobago	San Juan, Porto Rico	Havana, Cuba	U.S. Reg. Area
1919 ...	46.3	262.1	19.9	5.2	3.8
1920 ...	35.0	222.2	27.2	5.4	3.6
1921 ...	52.6	242.2	27.0	6.1	3.6
1922 ...	19.0	225.3	17.1	9.2	3.6
1923 ...	23.4	201.4	9.3	7.5	2.8
1924 ...	40.0	199.2	15.5	4.1	2.5
1925 ...	80.9	206.3	12.7	4.8	2.1
1926 ...	33.1	209.7	20.2	4.2	1.9
1927 ...	29.8	167.1	12.6	2.9	2.7
1928 ...	39.7	218.1	14.7	4.1	3.5
1929 ...	14.5	161.9	10.8	1.4	3.6

W. F.

RAYNAL (Jean). Note sur le paludisme d'altitude. [**Malaria at High Altitudes.**]—*Marseille-Méd.* 1932. Feb. 25. Vol. 69. No. 6. pp. 245-260. With 4 figs.

Guatemala City is situated in a central plateau at an altitude of 5,000 feet surrounded by lofty mountains. These highlands were free from malaria until about 1930, when malaria broke out suddenly in epidemic form. Its appearance is attributed to the return to their highland home of labourers who had been working on the sugar or banana estates down near the coast. The carrier in the highlands is *A. pseudopunctipennis*, and the malaria is benign tertian, though on the coast, where the labourers became infected, subtertian predominates. The reasons for this are, probably, that *P. falciparum* does not develop so well in either man or mosquito in the cold hills as it does in

the warmer plains, and that *A. pseudopunctipennis* is not such a good carrier of *P. falciparum* as *A. albimanus* and *A. argyrotarsis*, which are the anopheles of the plains. W. F.

RUSSELL (Paul F.). **Malaria. An Account of its Cause, Cure and Prevention. Prepared especially for the use of Students and Teachers in the Philippine Islands.**—*Bureau of Science Popular Bull.* 10. 62 pp. With 34 text figs. & 1 plate. 1931. Manila. Bureau of Printing.

The students and teachers of the Philippines are to be congratulated on having been provided with this most interesting booklet on malaria. It begins with an outline of the history of early investigations, with full-page photographs of the pioneers, LAVERAN, MANSON, ROSS, and GORGAS. The cause, transmission, predisposing factors, symptoms, diagnosis, and control of malaria are dealt with in various sections, and there are excellent illustrations. As the book is intended for Philippine students it deals almost exclusively with the Philippine anophelines. It will be noted that *A. funestus minimus*, the carrier, breeds only in the foothills. The lowlands are not malarious; nor are the mountains, for *A. minimus* is not found above 1,800 feet. Dr. Russell writes, on p. 45, "It may be stated definitely that quinine as a prophylactic drug is a failure." But he admits its value as an emergency measure, and writes that it "is at present the only practical method of maintaining the efficiency of temporary expeditions into regions where malaria is severe." W. F.

MISSIROLI (A.). *Tipi epidemici delle febbri malariche. [Epidemic Types of Malaria.]—Riv. di Malariologia.* 1932. Jan.-Feb. Vol. 11. No. 1. pp. 1-24. With 10 plates. [14 refs.] English summary p. 133.

Though based on a relatively small number of examinations (the inhabitants of Posada in Sardinia, where the investigation was carried out, amounted to 750) this article is of considerable interest. CELLI has distinguished three epidemic types of malaria in Europe: (1) The North-Europe type—nearly all benign tertian, early developing into epidemicity in the spring, very rarely quartan and never subtertian. (2) The Northern Italy type—benign tertian predominating, least in February and March, steadily increasing through the spring and summer and rapidly decreasing in the autumn. (3) The Southern Italy type—marked preponderance of subtertian, usually of high degree of virulence; least prevalent from February to June, sharp and rapid rise in July lasting throughout the summer, falling in the autumn, rapidly or slowly, according to meteorological conditions. The article is illustrated by several charts and tables from which it is seen that in Posada subtertian malaria diminishes from January to June, begins to develop epidemicity a month after the rise in the anopheline curve, attains a maximum in July, falls very slightly in August and rapidly in September and October. It is thus of the Southern Italy type of CELLI.

The charts and tables show that in the pre-epidemic stage there is a large number of crescent carriers, and it is due to these that malaria can occur although anopheles are relatively few. The author finds that benign tertian (in the sub-tropical zones) is largely a disease of

early childhood, becoming progressively rarer after the age of 12 years ; that immunity acquired against *P. vivax* is more solid than that against *P. falciparum* after repeated infections by the corresponding plasmodium. He maintains that the benign tertian observed in the spring in Posada is a recurrence of the infection of the previous year, and explains the subtertian prevalence over benign in July and August as due to "the greater receptivity of larger numbers of the population" [this appears more tautological than explanatory].

Swelling of the spleen was observed to be less after the epidemic season in children below 5 years, owing to intensive treatment, but the reduction was barely perceptible in those between 6 and 12 years and imperceptible above that age ; finally, the parasitic index taken just after the epidemic period, when quinine has been properly employed, is remarkably low and does not give a proper idea of the gravity of epidemic or endemic malaria.

H. H. S.

HACKETT (L. W.) & MISSIROLI (A.). **Housing as a Factor in Malaria Control.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. pp. 65-72.

Certain houses, notorious for malaria and known as "malaria houses," are supposed to be especially attractive to mosquitoes, because they are dark and damp, and consequently offer such an ideal shelter that the insects remain indefinitely, or return after every flight, and eventually infect the whole household. These "malaria houses," as distinguished from houses which are malarious because they are near a breeding place, are not important in themselves, the authors have never come across one in all their experience, but they have assumed a fictitious importance because on them has been built the theory that a chief factor in malaria is the attractive shelter afforded to anopheles, by dark, damp houses, and that the disease can be prevented by providing better houses and raising the standard of living. The authors' observations do not support this theory, for it is their experience that good housing or bad housing has little bearing on the fact that in one region anopheles enter houses, and in another they do not. For example, in North Germany, round Emden, the people are more prosperous, keep more cattle, and are better housed than the inhabitants of Baden, in the south ; yet malaria is endemic in the north, while it has disappeared from Baden in spite of the apparently equal number of anophelines in both places. At Valdichiana, which used to be intensely malarious, and where the inhabitants still live in ancient, dark, ill-ventilated dwellings, the anophelines do not come into the houses, and there is no malaria. In such places the anophelines seek the cow-sheds instead of the houses. In Fiumicino, on the other hand, where the houses are light and new, and where there are stables under the same roof, 25 per cent. of the mosquitoes caught on the premises were in the bedrooms. Several other examples are given (see the same authors, this *Bulletin*, 1931, Vol. 28, p. 569).

There is no good evidence to show that the lingering of a mosquito in the place where it has fed is an important factor in its becoming infective and causing new cases. While some vectors, such as *maculipennis* and *quadrinaculatus*, may remain in a house for a day or two, others, such as *maculatus*, leave after biting. The authors' experiments with stained anopheles did not show that there was any tendency for

them to return to the place where they had previously fed. *Maculipennis* in some regions seeks human habitations, in others it seeks stables. This difference in behaviour has nothing to do with the character of the houses or the stables, but is due to the anopheles in one district being of a different race, with different feeding habits, from the anopheles in another (see DE BUCK, SCHOUTE and SWELLENGREBEL *ante*, p. 345). One race (*A. maculipennis labranchiae* Falleroni) lays a grey dappled egg. It is relatively more prevalent in dwellings than the second race, and both in northern Europe and Italy there is a certain parallelism between the prevalence of this race and the incidence of malaria. The second race (*A. maculipennis messeae* Falleroni) lays an egg irregularly pigmented in bars and patches. It predominates in non-malarious areas, frequents stables more than dwellings, and goes into complete hibernation in winter. In certain regions it bites only animals and is completely dissociated from man. The phenomenon of "anophelism without malaria" is bound up with the food preferences of this barred-egg race, and not with housing standards. The authors have seen no satisfactory evidence of this kind in connexion with any species except *A. maculipennis*. It is indeed certain that nothing of this kind occurs in the case of *A. costalis*.

In a malarious locality the principal effort should be directed at screening the houses and destroying breeding places. More intensive agriculture and more cattle may, in *maculipennis* areas, favour the ascendancy of an innocuous race of insects. W. F.

SCHÜFFNER (W. A. P.), SWELLENGREBEL (N. H.), ANNECKE (S.) & DE MEILLON (B.). Vergleichende Untersuchungen ueber Malaria-immunität in Niederländisch-Indien und Südafrika. [**Comparative Investigations on Malarial Immunity in Dutch East Indies and South Africa.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. July 6. Vol. 125. No. 1/2. pp. 1-31. With 12 graphs. [27 refs.]

The authors carried out investigations amongst Malays in hyper-endemic malarial areas in Dutch East Indies and amongst Bantus in hyperendemic areas in South Africa with the help of methods, which in every particular, corresponded exactly, and they found that the adults had acquired an immunity against malaria. The immunity of the Malays they describe as parasitic immunity using ZIEMANN's name for it; this immunity is not a result of an inherited tolerance. The degree of immunity is inversely proportional to the adult parasitic index. On the other hand, the malarial immunity of the Bantus is identical with the "premunition" of SERGENT. It is only acquired by races who possess an inherited tolerance to the malarial parasite. The degree is proportional to the percentage of adult "carriers" with few parasites. The important researches in India by CHRISTOPHERS are fully referred to. The paper is an important one and is illustrated by graphs. It should be consulted in original by malariologists and others interested in the subject. E. D. W. Greig.

JAMES (S. P.), NICOL (W. D.) & SHUTE (P. G.). **A Study of Induced Malignant Tertian Malaria.**—*Proc. Roy. Soc. Med.* 1932. June. Vol. 25. No. 8. pp. 1153-1186 (Sect. Trop. Dis. & Parasit. pp. 37-70). With charts.

Several workers have thought that the malignant tertian parasite, because it sporulates in the brain, might have a higher therapeutic effect than the other forms. Usually the risks are too great; but,

at Horton, specialist experience, expert laboratory control, and trained nursing provide effective safeguards against these risks, and the fatality rate is only 4 per cent. as compared with 10 to 14 per cent. attributable to courses with *P. vivax* in the mental hospitals of England and Wales.

Some of the strains used came from India, some from Italy, and some from West Africa. In any study of malignant malaria, a problem of great interest is whether there is more than one species of malignant parasite. The passage of different strains through series of patients and frequent examinations of the blood of all cases did not enable the authors to detect any noteworthy morphological differences between them. They also found that the fever associated with all strains had a true tertian periodicity and was due to groups of parasites which sporulated every 48 hours. In many cases the fever appears to be irregular or quotidian; this is due to the presence of several groups of parasites sporulating at different times so that before one paroxysm has subsided, another is treading on its heels. It is a remarkable feature of malignant malaria that three or more groups of parasites are present. This is one of the chief reasons why malignant malaria is more severe than benign tertian where there are never more than one or two groups. The authors therefore conclude that there is no reason to postulate the existence of a quotidian parasite.

It has often been said that infections with *P. falciparum* in one place are more serious and difficult to cure than infections with the same species in another place; in this respect, the authors found that there was a wide difference between their strains; and they concluded that "there are various geographical races which, while not being morphologically different, can be recognized as being distinct by their clinical virulence, immunological reactions and other biological properties." The infections produced by the Roman strains were much more severe than those produced by the Indian strains, and it took about eight times as much quinine to control the primary attack. The fever periods lasted twice as long in infections with the Roman strains, and the relapses extended over a much longer period than with the Indian strains. There were 16 cases in the Indian group and none of them lasted longer than eleven weeks. In the Roman group, there were only 11 cases, but 7 of them lasted more than twenty-one weeks, and two of them developed blackwater fever.

There were also immunological differences as shown by the fact that a patient who had become immune to an Indian strain, as the result of repeated infections, was yet highly susceptible to infection with a Roman strain. Still another difference between the Indian and the Roman strains is the constant failure to infect European *A. maculipennis* with the Indian strains, though they are readily infected with the Roman strains. The reason why a given species of anopheline is a good carrier in one country and not in another, may be that the strains of parasites in the latter have no capacity to infect this particular anopheline.

Long incubation periods of six months or more, such as are sometimes seen in benign tertian malaria, have not been observed in malignant tertian; the longest incubation at Horton, after a mosquito-bite infection, was 17 days; the shortest was 6 days, and the mean was 12 days.

In benign tertian (see James *et al*, this *Bulletin*, Vol. 28, p. 566), apart from the recrudescences and relapses which occur in the first

24 weeks, 30 per cent. of the patients have a recurrence about 35 weeks after the date of infection. This does not happen in malignant tertian, in which the febrile attacks seldom occur after 24 weeks. Clinically it consists of a severe primary attack followed by several less severe recrudescences; in benign tertian there are, in addition, much later manifestations, the "relapses" and "recurrences." Malignant tertian is an acute disease as opposed to benign tertian which is a chronic one. The recrudescences are so much milder than the primary attack, that it is only in the latter that there is grave risk, apart from blackwater fever; the parasite infection diminishes in each recrudescence. Parasites sometimes persist in the blood long after the last febrile recrudescence; parasites were present in 10 out of 54 cases from 7 to 159 days after the last febrile attack.

The following conditions must be taken into consideration in appraising the value of quinine and other drugs:—(1) The mode of infection. (2) The degree of susceptibility. (3) The tolerance or immunity acquired by reason of former attacks. (4) The species of parasite. (5) The virulence of the particular strain. (6) The dose of infection. Patients with naturally acquired malaria who are treated in hospitals for tropical diseases in non-malarious countries, have already suffered from primary attacks and have developed some immunity. They are simply suffering from recrudescences and are therefore easily cured. This is the chief reason why systems of treatment, based upon experience in non-malarious countries, fail when they are applied in the tropics where primary attacks have to be treated.

The degree of tolerance or immunity acquired has a great influence on the subsequent course of the disease, and is so quickly acquired that, as a rule, all risk is confined to the primary attack. "This being so, it seems clear that, whenever it is possible to do so, it is in the best interest of patients suffering from malignant tertian malaria to use quinine only very sparingly for the treatment of recrudescences... with the object of allowing the patient to acquire the tolerance which alone... seems to bring about permanent recovery." The authors conclude from observations that "the advice invariably given in text books to the effect that in malignant tertian malaria one must set about giving quinine as soon as the diagnosis is made, may not always be in the best interests of the patient."

Treatment by erion, now called atebirin. Seven patients were infected, all with the same strain, Rome 11, by means of mosquitoes. Five were treated with atebirin 0.3 gram daily for five days, and two were treated with quinine. The primary attack was quickly controlled; but the quinine-treated cases had numerous recrudescences, while those treated with atebirin had none. Several other patients were given atebirin; among them were four who had continued to relapse for more than six months after their primary attacks, and two of them had had blackwater fever; in each case there was a quick disappearance of fever and parasites, and no subsequent recrudescence. Fifteen cases in all were treated with atebirin, and in only one did it fail to effect a permanent cure.

W. F.

GORDON (R. M.) & DAVEY (T. H.). *P. malariae* in Freetown, Sierra Leone.—*Ann. Trop. Med. & Parasit.* 1932. Mar. 19. Vol. 26. No. 1. pp. 65–84. With 1 map & 2 graphs. [2 pages of refs.]

The authors examined native children by the thick film method during the months February to September 1931. The examination

showed a great increase in quartan malaria as compared with other years. The only anopheles found in the houses were *A. costalis* (many) and *A. funestus* (few). They attempted to infect these mosquitoes, but without success. On reviewing the attempts of others to do this they found no unimpeachable evidence of success, and they state that "It seems a very surprising fact that the evidence regarding the transmission of *P. malariae* by anophelines should rest on such a small basis of fact." Malaria in children rises steeply to 40 per cent. at 18 months, the rate remains fairly constant to 13 years of age and then falls to 14 per cent. by 16 years. The commonest parasite in children between 3 and 14 years old was *P. malariae*. The percentages were :—*P. falciparum* 16·1 per cent. ; *P. malariae* 19·6 per cent. ; *P. vivax* 0·1 per cent. The proportion infected with malaria parasites was about 40 per cent. *P. ovale* Stephens was not found. *W. F.*

TOPORCOFF (T.). [Epidemiology of Quartan Malaria.]—*Trop. Med. & Vet. Moscow*. 1931. Vol. 9. No. 1. pp. 3-6. [In Russian. English summary.]

A study of the distribution and epidemiology of quartan malaria in Russia based on statistics for a period of five years (1924-1928). The prevalent idea that this type of malaria occurs in isolated foci was based on single examinations in separate localities and is not borne out by the present investigation. Quartan malaria was found to be evenly distributed in all parts of the country where malaria is prevalent, and the percentage of cases in relation to that of the other forms of malaria is fairly constant. A certain seasonal periodicity was observed, the incidence being the highest in the autumn and winter months.

C. A. Hoare.

LAMBERS (J. A. P. Hille Ris). Over quartana-nephritis en haar beteekenis in Suriname. [On Quartan Nephritis and its Significance in Surinam.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. Mar. 15. Vol. 72. No. 6. pp. 334-346. [14 refs.]

The connexion between quartan fever and nephritis is more and more generally recognized. Clinically the kidney affection is a combined nephrosis and nephritis, running a chronic course ; the prognosis as regards recovery is unfavourable.

The author's statistical research in Surinam (Dutch Guiana) reveals the following facts. Out of 28,000 hospital cases under 40 years of age there were 1,833 microscopically established cases of malaria (31 per cent. subtertian, 42 per cent. tertian, 12 per cent. quartan, 1 per cent. mixed 14 per cent. undefined). Out of 222 cases of quartan fever 109 had nephritis (49·1 per cent.), of the subtertian cases 3·8 per cent., of the tertian cases 5·3 per cent. Of 676 cases of nephritis 109 were caused by quartan malaria (16·8 per cent.). This characterizes quartan fever as a factor of real importance in the causation of nephritis in Surinam. Yet the author does not consider the connexion as a specific one, but (like GIGLIOLI) thinks that the benign character of quartan fever allows the patients to refrain from adequate treatment for a much longer period than they can stand in subtertian or tertian infections, so enabling the (quartan) malaria to exercise its nephritis-producing toxic influences on the system more effectively than in the other types of fever.

W. J. Bais.

DAVIS (N. C.) & KUMM (H. H. W.). **Further Incrimination of *Anopheles darlingi* Root as a Transmitter of Malaria.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 93-95.

Many malaria cases occurred among workmen and their families at Iranca, in Bahia, during February 1931. The predominant larvae in breeding areas were *A. albitarsis*, but the only anopheles caught in the houses were *A. darlingi* and 28·7 per cent. were infected out of 240 examined ; 7·4 per cent. showed sporozoites. W. F.

THONNARD-NEUMANN (E.). Plazentare Malariaiinfektion, kongenitale Malaria und Impfmalaria. [**Placental Malarial Infection, Congenital Malaria and Inoculation Malaria.**]—*Muench. Med. Woch.* 1932. Mar. 4. Vol. 79. No. 10. pp. 382-383.

The author considers that during the latent period the malarial parasite finds, in addition to the spleen, liver and bone marrow, the placenta very suitable as a temporary resting place. In Panama in coloured women it was found in the placenta in 7 per cent. of cases by CLARK, but in only 3 per cent. in the peripheral blood as well. The author in 1928 in Panama found a heavier infection, in 20 per cent. a positive finding in the placenta, but only 5 per cent. of the women showed a simultaneous peripheral blood infection. For the transmission of the infection to the foetus damage to the placenta is necessary. He states that he does not know whether in autopsies of cases of G.P.I. treated by malarial therapy plasmodia have been found in the spleen, liver or bone marrow, indicating that the parasites had merely been removed from the peripheral blood by the quinine treatment and the malaria had passed into a latent condition. [The reviewer has examined the brain, liver and spleen of several cases of G.P.I. being treated by B.T. malarial therapy and who died during or shortly after the course and has not been able to demonstrate malarial parasites in them. Both smears and sections were made.] E. D. W. Greig.

RUGE (Reinhold). Die Malaria-Therapie und Prophylaxe in ihrem Verhältnis zur Unfallversicherung. [**Malaria Therapy and Prophylaxis in Relation to Accident Insurance in Germany.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. May. Vol. 36. No. 5. pp. 253-260. [36 refs.]

The author takes as his text a government order of 1929, which schedules tropical diseases as occupational diseases for insured sailors. It reads as follows :—" Compensation can be claimed if a drug, which has been administered for the treatment of an occupational disease, causes damage which leads to loss of employment or death." He considers the various accidents which may occur in connexion with quinine administration, particularly quinine idiosyncrasy. He then discusses plasmoquine, which he favours for the curative and prophylactic treatment of malaria. As a result of his study he lays down the following dictum :—" For steamers trading to malarial coasts prophylaxis with the completely innocuous plasmoquine should be compulsorily introduced, and any one refusing this prophylaxis should forgo all accident benefits for malaria." E. D. W. Greig.

TOULLEC (F. L.). L'expertise du paludisme. [**Examination for Malaria.**—*Marseille-Méd.* 1932. Jan. 25. Vol. 69. No. 3. pp. 97-105.]

This paper is concerned with the examination of pensioners claiming benefit on account of malaria. Most authorities agree that malaria is soon cured after return to France. For example RIEUX states that a year or a year and a half is enough, and that he has never found parasites after two years. MARCHOUX has found none later than three years. There are, however, incontestable observations of relapses 6, 9, 13 and even more years after return from a malarious country, and these exceptional cases are rightly taken into consideration by legal authorities. Therefore all pensioners must be thoroughly examined and a scheme for their examination is set out in detail.

W. F.

ELDIN (M. Salah). **The Nature of Pulmonary Lesions in Malaria.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. May. Vol. 36. No. 5. pp. 260-275. With 5 text figs. [39 refs.]

The author concludes :—

"Malarial infection produces lesions in the lung, some of which can be attributed to the direct action of the parasite and its products: these are :—

"1. A proliferative congestive lesion of the alveolar walls was found constantly in 7 post-mortems. It usually occurs in chronic malaria tropica cases; and it can produce the clinical picture designated. . . as 'intermittent malarial pneumonia'."

"2. Minute multiple infarcts were found in one case. . . ." [cf. DUDGEON & CLARKE 1918]

Some excellent micro-photographs are given.

W. F.

HOLLAND (J. H.). **Ledger Bark and Red Bark.**—*Kew Bull. Misc. Information.* 1932. No. 1. pp. 1-17. [12 refs.]

This paper deals with the early history of Cinchona planting (see this *Bulletin* 1931, Vol. 28, p. 817). Only about one pound of the seeds which Ledger sent to England in 1865 were sold to Java; the remaining 13 pounds were bought by Mr. J. W. B. Money, an Indian planter, who exchanged them for *C. succirubra* seed, with the Director of Cinchona Culture. The *Calisaya Ledgeriana* seeds were sown in the Nilgiri plantations, but they did not do well. The seed sown in Java, however, prospered excellently in the volcanic soil of the Preanger district. Though *C. succirubra* grows well in India, and has a high content of total alkaloids, its content of quinine is lower than *C. Ledgeriana*; even when *Calisaya* is cultivated in India it does not yield nearly as much quinine as when grown in the more suitable soil of Java. Medical opinion has favoured the use of quinine to the exclusion of other alkaloids though it has been shown repeatedly that they differ little in therapeutic value; the price paid for the bark depends therefore on its quinine content, and consequently no country has been able to compete with Java. Sir David PRAIN, speaking of the "monopoly," has said that it is not the creation of Java, but it is due to the fact that the quinine-producing *C. Ledgeriana* grows better there than anywhere else, and that quinine is prescribed to the exclusion of the other alkaloids. Various Commissions have reported in favour of the use of

the total alkaloids, and this will render easier the increased production which they recommend, because the hardier trees, such as *C. succirubra*, will flourish in many countries where *Ledgeriana* will not grow. Burma, Ceylon, Jamaica, Cameroons, Tanganyika, and British Malaya, are countries in which planting may be extended. Totaquina (see HENRY, below) is not the first standardized preparation of the mixed alkaloids; in 1923, the Government of Madras introduced a standardized preparation of cinchona febrifuge, under the name "Malarene," which gave excellent results.

W. F.

DE VOGEL (W. Th.). Le "monopole" hollandais du quinquina. [**The Dutch Cinchona "Monopoly."**].--*Bull. Office Internat. d'Hyg. Publique*. 1932. Feb. Vol. 24. No. 2. pp. 278-290. With 1 text fig.

[An important paper by Dr. M. KERBOSCH which dealt with this question was summarized on p. 817, Vol. 28, 1931, of this *Bulletin*. The present communication deals with it from a rather different angle.] The convention between the planters and the manufacturers of quinine was suggested by the Government of the Dutch Indies in order to save the industry from the ruin which threatened it from the violent fluctuation in prices manipulated by financial speculators. In 1884, the price of quinine before extraction was 51 florins per kilogram. The cultivation of quinine was then encouraged by the Government, and seeds of the rich *Ledgeriana* were supplied to the planters; but from these seeds grew, not *Ledgeriana* which is itself a hybrid, but a mixed lot of trees, so poor in quinine that all calculations were upset and the planters were faced with serious losses. The Government came to their help, with knowledge obtained by careful experiment, and supplied them with cuttings from selected trees which were grafted on the stumps of those which they had originally planted. But when at last the planters put their bark on the market, they could only get a third of the price obtained in 1884, though the price of quinine after extraction and preparation in Europe had actually gone up. By 1896, the production of quinine had greatly increased and the price of the unextracted alkaloid had fallen to only a tenth of what it had been twelve years before. Ceylon planters were ruined and abandoned cultivation. The price of extracted quinine was disproportionately high, and so the planters of Java set up their own factory in order to escape the strangle hold of the manufacturers. The answer of the latter was to flood the market with quinine sold at a loss. Many plantations were then abandoned, less quinine was produced, and, in a couple of years, the price rose once more. This led to more planting which was followed by another slump, this time so severe that several planters sold their estates for a single florin on condition that the purchaser took over the liabilities.

It appeared to the Government that the only way to preserve the industry was by an agreement between the planters and the manufacturers regulating the supply in accordance with the demand, and regulating the price of the bark with regard to the price of quinine. The Government, which itself produces 10 per cent. of the total output of bark on its own plantations, subscribed to the arrangement only on condition that quinine should be supplied cheaply to places in need of it, and reserved the right of withdrawal should the convention impede the provision of the drug to malarious countries. In the early days

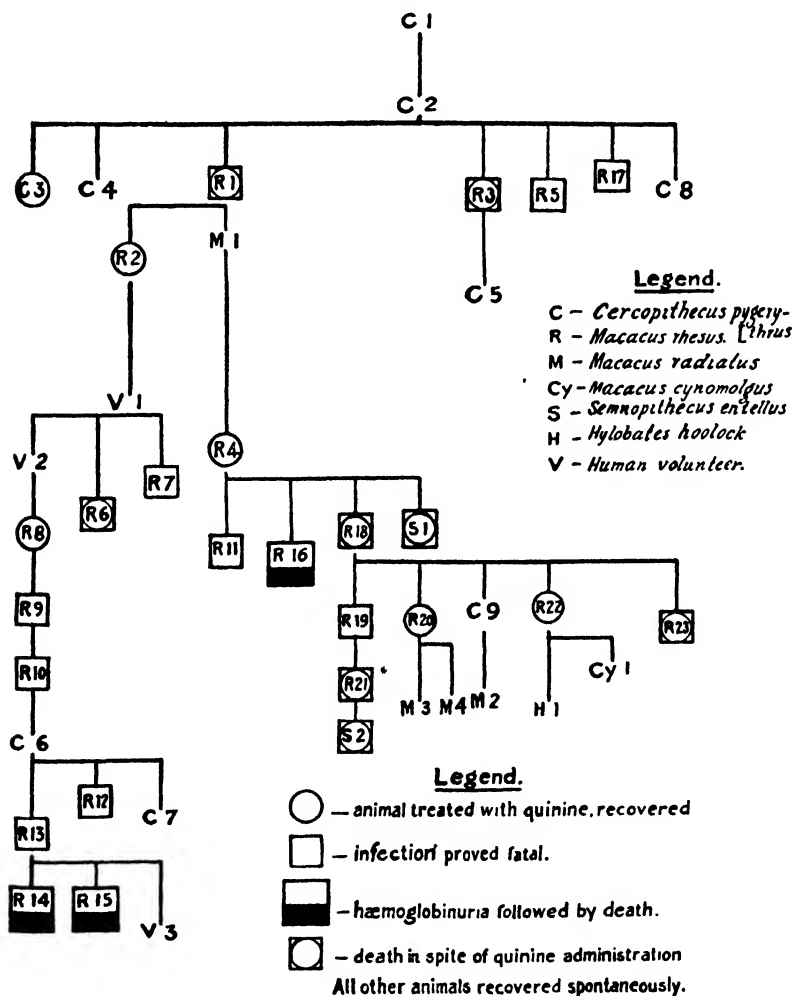
of the association the war broke out, communication between manufacturers in different countries was interrupted, and quinine once more fell into the hands of speculators. It was then that, according to Martindale and Westcott (*Extra Pharmacopoeia*), the Kina Bureau saved the situation by providing quinine at a reasonable price. That planters are not making a fortune by exploiting the needs of the sick is shown by the fact that there was a reduction of a thousand hectares of quinine in Java between 1929 and 1930. It has been said that the price of quinine, stabilized by the convention, is too high to allow of its purchase by the governments of malarious countries in quantities sufficient for their needs. A diagram is given depicting in black columns the total annual expenditure of several malarious countries such as Greece and Bulgaria, and, for comparison, the amount spent on quinine, and also the amount which would need to be spent in order to supply the drug to all who needed it. Even the latter expenditure would be an infinitesimal addition to the total budget. Again, why should Java be held responsible for a quinine shortage in other countries? Would the rice-producing countries, such as Burma and Indo-China, be blamed if there were a rice famine in Java? As a matter of fact the association has helped many foreign countries to supply quinine to their necessitous subjects, and, in April 1931, an offer was made to the Malaria Commission of the League of Nations to supply 500,000 kilogrammes of quinine annually at four-sevenths of the official price. The courage and persistence of the Dutch planters in the face of grievous losses, and the peculiarly suitable soil and climatic conditions of Java, have contributed to the success of cinchona cultivation in the country which now supplies 97 per cent. of the world's quinine, and only in this sense is it a monopoly. The association helps other governments who wish to cultivate cinchona by supplying them with plants and seeds, and also by putting their long experience at their disposal. Even in Java, planting is not restricted to the Dutch; there are many foreign planters, and the Italian Government owns a large estate in Java. The author has no doubt that the Government of the Dutch East Indies, by bringing about the agreement between the planters and the manufacturers, saved cinchona planting from extinction, and assured the quinine supply of the world. W. F.

NAPIER (L. Everard) & CAMPBELL (H. G. M.). **Observations on a Plasmodium Infection which causes Haemoglobinuria in Certain Species of Monkey.**—*Indian Med. Gaz.* 1932. May. Vol. 67. No. 5. pp. 246-249. With 1 chart.

A plasmodium resembling *Plasmodium kochi* was found accidentally in a monkey (*Cercopithecus pygerythrus*), whose health was unaffected. Other monkeys, both *cercopithecus* and *Macacus rhesus*, were inoculated with the blood of the first, and several further passages were made. The infection ran a mild course in the *cercopithecus* monkeys, but, in the *macacus* monkeys it was virulent, and 11 out of 12 of them died. Haemoglobinuria occurred in 8 of the 11 fatal cases. None of these 11 cases was treated with quinine; in other cases, in which quinine was given, there was no association between the occurrence of haemoglobinuria and the giving of quinine. The haemoglobinuria was always associated with heavy infection. The virulence of the strain, and the tendency to produce haemoglobinuria, appeared to increase with passage. W. F.

KNOWLES (R.) & GUPTA (B. M. Das). **A Study of Monkey-Malaria, and its Experimental Transmission to Man.** (A Preliminary Report.)—*Indian Med. Gaz.* 1932. June. Vol. 67. No. 6. pp. 301–320. With 7 plates (5 coloured), 6 charts & 1 graph.

This paper records the transmission of monkey malaria to man, and back again to monkey. An extremely scanty infection with a plasmodium was found in an African monkey, *Cercopithecus pygerythrus*, said to have been imported from Singapore; the strain was passed into others of the same species and thus established in the laboratory; [NAPIER and CAMPBELL made their experiments with the same strain. See above.] In *C. pygerythrus* it caused a mild infection which disappeared spontaneously, or was readily cured by quinine. The parasites in this monkey resembled benign tertian; the corpuscles



Graph showing passages of virus of monkey-malaria. The vertical lines are proportional to the incubation periods (i.e. from inoculation to the first appearance of parasites in the inoculated animals).

[Reproduced from the *Indian Medical Gazette*.]

were swollen and Schüffner's dots were present. In *Macacus rhesus* it caused very severe infections. After about 5 days of fever the temperature fell suddenly and the animals died. There was intense anaemia with normoblasts, anisocytosis and basophilia. Parasites were present in enormous numbers, and in 3 monkeys out of 23 haemoglobinuria occurred just before death. The parasites did not disappear with the onset of the haemoglobinuria. The morphology of the parasites was completely changed by inoculation into this monkey. The corpuscles were not enlarged, there were no Schüffner's dots, and the ring-forms and rosettes resembled *P. falciparum*, though there were only 8 to 11 merozoites. The gametocytes resembled those of *P. malariae*. The infection was transmitted to three human volunteers by inoculation. In one the disease was mild, in another it was moderate, and in the third extremely severe. The infection was passaged back to monkeys, from two of these human cases. The morphology of the parasite in man was much the same as in rhesus monkeys, but there was a greater resemblance to *P. malariae* W. F.

GREEN (Richard). **A Malarial Parasite of Malayan Monkeys and its Development in Anopheline Mosquitoes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 455-477 With 2 plates (1 coloured) & 7 figs. [33 refs.]

A malaria parasite in the blood of monkeys was discovered by KOCH in 1898. LAVERAN gave it the name *P. kochi*. The author describes, with excellent illustrations, a parasite of the common Malayan macaque *Macaca irus*. The parasite resembles the benign tertian parasite of man, and is identified as *P. inui*; it occurred in a quarter of the monkeys examined. It persists for many months and the disease runs a benign course. *A. kochi*, *A. maculatus* and *A. vagus* became infected after feeding on parasitized monkeys, and the oöcysts were indistinguishable from those of benign tertian. Culicines and monkey lice gave negative results. Attempts to infect monkeys by injecting sporozoites of *P. inui* and of *P. falciparum*, or human blood containing *P. vivax*, were unsuccessful. From the evidence available, it appears improbable that, in the ordinary course of events, man becomes infected with the malaria parasites of other primate families, but this point requires further investigation. The finding of oöcysts or sporozoites in mosquitoes, within an area where there are monkeys, is not necessarily evidence of infection with human malaria. W. F.

ADANT (M.). Tentative d'inoculation du paludisme aux singes (*Plasmodium falciparum*). [**The Inoculation of Monkeys with *P. falciparum*.**].—*Ann. Soc. Belge de Méd. Trop.* 1931. Dec. 31. Vol. 11. No. 4. pp. 371-372.

Two *Cercopithecus subaeus* and two cynocephalus monkeys (one of each species having been splenectomized) were inoculated subcutaneously with 10 cc. of citrated blood heavily infected with *P. falciparum*. Frequent examinations were made for 30 days, but no parasites were found. Inoculations were repeated, using non-citrated blood rich in subtertian parasites and injecting it into the saphenous vein. Daily examination of the blood for 45 days was negative. Films made from spleen and liver puncture were also negative. W. F.

HUFF (Clay G.). **Further Infectivity Experiments with Mosquitoes and Bird Malaria.**—*Amer. J. Hyg.* 1932. May. Vol. 15. No. 3. pp. 751-754. [12 refs.]

There are four species of malaria, differing widely both morphologically and biologically, to which the domestic canary is susceptible:—(1) *Plasmodium relictum* Grassi and Feletti (often called *Proteosoma* or *Plasmodium praecox*), (2) *P. cathemerium* Hartman, (3) *P. rouxi* Sergeant, (4) *P. elongatum* Huff. The first two have rounded gametocytes which displace the nucleus of the red cell; the other two have elongated gametocytes which lie alongside the nucleus. The importance of recognizing these different species is that the susceptibility of mosquitoes is not the same to all of them. A certain culicine may be readily infected with one but not with another. In reports of experiments with bird malaria, the species of parasite should always be specified.

W. F.

i. DE FEYTER (C.). Contribution à l'étude du paludisme congénital. [**Congenital Malaria.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 245-248.

ii. VAN NITSSEN (R.). Le paludisme congénital.—*Ibid.* pp. 249-252. [21 refs.]

i. Six newly born babies were examined at the end of the dry season when anopheles were not breeding in the neighbourhood. Schizonts were found in three babies. The first was examined two hours after birth; the second, seven days after; the third was born dead at the sixth month, and parasites were found in its spleen and in blood from the cord. The mothers were infected in all three cases.

ii. Reviews the "literature" on the subject and concludes that congenital malaria is rare and only occurs when the placenta is damaged.

W. F.

SENEVET (G.). Mécanisme de l'accès paludeen par le choc hémoclasique. Nouveaux faits à l'appui de cette thèse. [**Haemoclastic Shock in the Mechanism of the Malarial Paroxysm.**]—Reprinted from *Sci. Méd. Assoc. Franc. pour Avanc. des Sci.* Algiers. 1930. pp. 336-345. [25 refs.]

The author and Professor ABRAMI, about eleven years ago, advanced the hypothesis that the malaria paroxysm was caused by a haemoclastic shock which preceded it by some hours. This paper reviews observations on the subject which have been made during the intervening years. In support of the hypothesis:—(a) The therapeutic action of induced malaria in general paralysis is similar to that of protein shock. (b) Examination of the blood at short intervals before the paroxysm shows that schizogony and leucopenia take place two or three hours before it occurs. (c) Certain manifestations, which are often associated with protein shock, such as urticaria and asthma, are sometimes associated with attacks of malaria.

W. F.

GUYOMARC'H, TOULLEC & ALAIN. Episode démentiel et gangrène symétrique des extrémités au cours d'une infestation palustre à *Plasmodium praecox*. [**An Attack of Dementia with Symmetrical Gangrene, in a Case of Infection with *P. falciparum*.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4 pp. 307-310.

A young soldier was sent home from Morocco, very ill, wasted and anaemic; he suffered from delusions and lack of orientation. The

mental symptoms had appeared suddenly, three months before. On the day after admission to hospital, it was found that one in every four of his red cells contained a subtertian parasite. He was treated with quinine in large doses, by the mouth and into the gluteal muscles. The malaria and the mental symptoms disappeared at the same time, but he had no memory of the 3 months during which they had persisted. Family worries had been a predisposing cause. Four days after treatment was begun, the toes became blue and, eventually, gangrenous.

[The author attributes this to the malaria, and does not consider the quinine treatment as a possible cause.] W. F.

SCHULEMANN (W.). **Synthetic Anti-Malarial Preparations.**—*Proc. Roy. Soc. Med.* 1932. Apr. Vol. 25. No. 6. pp. 897-904 (Sect. of Trop. Dis. & Parasit. pp. 15-22). With 8 diagrams.

The author gives an outline of the experiments undertaken at the Bayer-Meister-Lucius Research Laboratories in the synthesis of anti-malarial preparations. The only drugs, other than quinine, which showed any definite action were methylene blue and salvarsan. The author and his colleagues based their experiments on methylene blue, and they put in new groups in place of those originally present in the molecule. The various products were tested by ROEHL on canaries infected with proteosoma.

"In one of the aromatic amino groups of methylene blue we substituted an aliphatic basic group in place of an alkyl radical. . . . We changed the position of the amino groups in the quinoline ring, introduced every conceivable substitute in the quinoline nucleus in addition to the amino group, and also used many other heterocyclic rings. Furthermore, we varied the side chains and finally the basic aliphatic group. . . . The length of the carbon chains was altered, and it was made into branched chains in many different ways. . . . The action of all these compounds was tested . . . by Roehl, and from among them we chose plasmoquine for practical clinical investigation."

Structural formulae are given, illustrating several of preparations which were tested on birds. The three types of malaria parasites react to drugs in different ways: arsenic compounds act on *P. vivax*, not on *P. falciparum*; methylene blue acts on *P. malariae*, but has little effect on *P. vivax* and none on *P. falciparum*; quinine does not produce the same effect upon all three species. Moreover, the various stages of development of the parasites react to drugs in different ways; for example, plasmoquine has no effect on subtertian schizonts but it destroys the gametocytes. Though treatment with plasmoquine will render a gametocyte-carrier incapable of infecting mosquitoes, Professor Schulemann considers that it will rarely be possible to treat every carrier in a district, and that, therefore, antimosquito measures are still necessary. MIETZSCH and MAUSS have elaborated a new compound (atebrin) which has been tested in animal experiments by KIKUTH in the Elberfeld Laboratories. It acts on the schizonts like quinine, and has no effect on the gametocytes; it also appears to reduce the number of relapses after treatment.

In the discussion following this paper Colonel S. P. JAMES said that, as Professor Schulemann had stated, the problem was fourfold: first, the problem of the sporozoites; second, that of the asexual parasites; third, that of the sexual forms; fourth, that of the forms responsible for relapses. Plasmoquine acted on the sporozoites, but was not entirely satisfactory because in an intensely malarious place it was

necessary to take more than 4 centigrams a day to secure protection, and that might produce toxic symptoms. Quinine and plasmoquine acted respectively upon the asexual and sexual stages, but no drug was yet known which acted upon the stage which was responsible for relapses. The chief difficulty in appraising the value of new remedies lay in the existence of many different strains of each species of malaria parasite, some of which were much more virulent, and resisted treatment more than others.

W. F.

KIKUTH (Walter); SIOLI; PETER (F. M.). Zur Weiterentwicklung synthetisch dargestellter Malariamittel. [**Further Developments in Synthetically Produced Drugs for Malaria Therapy, Atebrin.**] I. Ueber die chemotherapeutische Wirkung des Atebrin [KIKUTH].—*Deut. Med. Woch.* 1932. Apr. 1. Vol. 58. No. 14. pp. 530–531. [10 refs.]; II. Ueber die Wirkung des Atebrin bei der Impfmalaria der Paralytiker [SIOLI].—*Ibid.* pp. 531–533. With 5 text figs.; III. Ueber die Wirkung des Atebrin gegen natürliche Malariainfektion [PETER].—*Ibid.* pp. 533–535. With 1 text fig.

I. Chemotherapeutic Action of Atebrin.—The chemists, MIETZSCH and MAUSS, working in the research laboratory of the I. G. Farbenindustrie in Elberfeld, have developed the work on plasmoquine, and have made a new advance in malaria therapy by the production of the new drug Atebrin. Its constitutional formula will be published in the course of the present year. It is the dihydrochloride of an alkyl-aminoalkylaminoacridin derivative. The author has tested its chemotherapeutic properties experimentally, using for the purpose *Haemoproteus orizivora*, present in the blood of finches. He established by his experiments that atebrin is a schizontocide, differing therefore from plasmoquine which is essentially a gametocide.

II. Action of Atebrin on Inoculation Malaria in G.P.I.—Sioli has shown that in inoculation malaria in cases of G.P.I. atebrin is a very active therapeutic agent, and has an unusual capacity for preventing relapses. He recommends 0.1 gm. thrice daily for several days. Single doses of 0.2 gm. and daily total doses of 0.6 gm. have been well tolerated; higher doses have caused gastrointestinal disturbance. Frequently a yellow colour of the skin is noted after administration of atebrin, this is temporary and has no ill effect on the health, it is due to a pigmentary action of the drug and not to jaundice.

III. Action of Atebrin in Natural Malarial Infection.—Peter treated cases of malaria in Rumania with atebrin, 3 cases of benign tertian (2 natural infection, 1 inoculated) and 2 cases of malignant tertian malaria. In the case of benign tertian the total dose of atebrin was 1 gm. and in the cases of malignant tertian 2 gm. Atebrin appears to be slowly excreted in the urine. He concludes, from the limited material, that atebrin acts on all stages of benign tertian parasite. It first destroys the rings, then the dividing forms and lastly it acts on the gametocytes. In the case of the parasite of malignant tertian malaria it rapidly destroys the rings, but is therapeutically inactive on the crescents; indeed he thinks the latter increase in the peripheral blood. He notes the yellow colouration of the skin.

E. D. W. Greig.

MÜHLENS (P.). Die synthetischen Malaria-mittel Plasmochin und Atebrin. [**Synthetic Drugs, Plasmoquine and Atebrin, for Malaria-therapy.**].—*Muench. Med. Woch.* 1932. Apr. 1. Vol. 79. No. 14. pp. 537-540.

The author recalls that it was the shortage of quinine during the war which led to the production in Germany of plasmoquine, and he refers to its curative and prophylactic properties. He then goes on to discuss the new drug atebrin and refers to the work of KIKUTH, SIOLI and PETER (above). In Hamburg from 24th November 1930, to the end of February 1932, 122 cases (17 benign tertian, 8 quartan, 85 malignant tertian, 2 cases of quinine idiosyncrasy and 10 post malarial conditions) were treated with atebrin alone and in combination with plasmoquine. His results confirm those of SIOLI and PETER. He finds that the rings in malignant tertian are more rapidly affected than by plasmoquine. Cases of quartan infection are also cured, but the gametocytes took longer to disappear than with plasmoquine. It was well tolerated by the subjects of quinine idiosyncrasy and of blackwater fever. The author had also the opportunity of testing the drug during a journey in Mexico, Venezuela and Colombia from January to March 1931. On his return from S. America in April 1931 he continued his observations at Hamburg. From his various observations he concludes that (1) The 122 patients tolerated the drug well up to a total dose of 4.8 gm. In many cases a yellow discolouration of the skin developed during treatment, but without liver damage and it disappeared in 2 to 3 weeks at most. (2) Atebrin acts well on all three species of malarial parasite, but better on the schizonts than on the gametocytes. An ideal combination is with the gametocide, plasmoquine. (3) For malignant tertian a course of 7 to 10 days of atebrin, 0.1 gm. and plasmoquine, 0.01 gm., thrice daily is recommended. Whether or not after treatment will be required will have to be determined by further observations. (4) Atebrin is well tolerated in quinine idiosyncrasy and blackwater fever. (5) Seeing that atebrin can be determined in the urine for weeks, exact observations on its prophylactic value are indicated. (6) Up to now the most promising medical prophylaxis is, 1 tablet daily of quinoplasmoquine or 2 tablets of plasmoquine co. (7) According to our observations the treatment of the three kinds of malarial infection with atebrin and plasmoquine gives at least as good results as with quinoplasmoquine. It is distinctly superior to simple quinine administration in its gametocidal action, even when quinine is given intramuscularly.

E. D. W. Greig.

MÜHLENS (P.) & FISCHER (O.). Ueber Malariabehandlung mit Atebrin. [**Treatment of Malaria with Atebrin.**].—*Arch. f. Schiffsu. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 196-207.

The essentials of this article will be found above. An interesting observation is recorded regarding the yellow colouration of the skin. They find that if patients taking atebrin are exposed to ultra violet radiation the yellow colour does not develop, but it is stated that the face becomes beautifully sunburnt in appearance without any hypersensitiveness to light as occurs in trypanflavine treatment. Also they noted that patients in the tropics who were exposed to the sun's rays for a time did not become yellow. They found that no damage was done to the system by the administration of atebrin; in particular

no disturbance of kidney function and of blood formation occurred. Interesting observations are being carried out on atebtrin in urine by Dr. WEISE, which will be published later. *E. D. W. Greig.*

GREEN (Richard). **A Report on Fifty Cases of Malaria treated with Atebrin. A New Synthetic Drug.**—*Lancet*. 1932. Apr. 16. pp. 826-829.

Atebrin, originally called erion, is readily soluble in water, has a bitter taste and, like quinine, shows fluorescence in high dilution under ultraviolet radiation. It compares favourably with quinine in ridding the blood of malaria parasites, but it takes slightly longer to destroy subtertian rings and schizonts. It has no more effect upon crescents than quinine has, nor does it prevent their development in mosquitoes. It appears to be superior to quinine in preventing relapses; 13 relapses were observed among 34 quinine-treated cases, but none among 19 treated with atebtrin. A daily dose of 0.1 gram per 15 kilograms (33 lbs.) of body weight appeared to be the optimum. Two 0.1 gram tablets every morning, and one tablet every evening were given to the author's patients, with an average body weight of 48 kilograms (105 lbs.). The treatment was continued for seven days. The drug appears in the urine on the third or fourth day after the commencement of treatment, and can be detected for eight or nine days after it has been stopped. A rough test is the production of a characteristic yellow colour on adding acid to the urine and heating. The makers recommend extracting the alkalized urine with ether, and dissolving the residue resulting from the evaporation of the ether extract in strong sulphuric; this assumes a yellow colour, strongly fluorescent. In about 14 per cent. of the cases a yellow discolouration of the skin and whites of the eyes was noticed; this was an effect of the drug, not jaundice. This yellow colour generally appeared at the end of the course of treatment and lasted one or two weeks. Cases in which the drug does not appear in the urine by the third or fourth day of treatment are likely to become yellow. Four of the 50 patients complained of abdominal pain, severe in three cases, mild in one, intermittent and lasting some hours, occurring as early as the fifth day of treatment and as late as the fifth day after it had been stopped. Two patients complained of headache. An important difference from quinine is that atebtrin appears to accumulate in the body. *W. F.*

NAPIER (L. Everard) & GUPTA (B. M. Das). **Atebrin: a Synthetic Drug for the Treatment of Malaria.**—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 181-186. With 2 charts.

Eleven patients were each given one tablet containing 0.1 gram of atebtrin, three times a day for four days. The fever was controlled and the asexual parasites disappeared from the peripheral blood, but crescents were not destroyed. There were no toxic symptoms or yellowing of the skin. The drug did not cause a reappearance of haemoglobinuria in a blackwater fever patient who was treated with it. A boy of 14 was given one tablet of atebtrin, on the following day he was bitten by nine *A. stephensi* infected with *P. falciparum*, and he was then given one tablet daily for six days. Neither parasites nor fever appeared during the two months of subsequent observation, though

other persons bitten by the same batch of mosquitoes became infected. The authors conclude that atebirin had a prophylactic action in this instance.

W. F.

ARBONA (Antonio). Ensayo preliminar con atebirina en el tratamiento de la malaria. [*Atebrin in Malaria.*—*Bol. Asoc. Med. de Puerto Rico.* 1932. Vol. 24. No. 201. pp. 248-253.]

The objects of the investigation here recorded were to determine the effect of atebirin on the temperature in malaria, the persistence of parasites after its use, the presence of toxic symptoms, if any, and finally the effects, when combined with plasmoquine, on the parasites and the patients. The daily dosage (divided into three doses) given for 5 successive days was 0.1 gm. atebirin and 0.01 [*i.e.*, 10] cgm. plasmoquine for children under 5 years, double this for those between 6 and 10 years, and treble for those of 11 years upwards [2 cgm. in place of 3 cgm. of plasmoquine is stated in some parts of the article; this may be a misprint.]

In a first series of 28 cases, 14 male, 14 female, 21 adults (*i.e.*, 11 years or over), 7 children, there were 19 with *P. vivax* infection (7 with gametocytes), 9 with *P. falciparum* (5 with gametocytes.) The temperature became normal in 1.4 days on an average in the benign tertian cases and 2 days in the subtertian. Only one patient, a lad of 16 years, still showed parasites in his blood after the course was completed.

In a second series of 23 patients, 11 over the age of 11 years, there were 18 females and 5 males, 12 with *P. falciparum* (3 with gametocytes), 11 *P. vivax* (4 with gametocytes). The average duration of the fever was 1.3 days, the temperature becoming normal in the *vivax* cases after 2.3 doses and the *falciparum* cases after 2.9. Two did not have the full course and disappeared; none of the remaining 21 showed any parasites after completion.

In the third series of 18, there were 11 "adults"; 16 had *P. falciparum* infection, and there was one each of *P. vivax* and *P. malariae*. The latter two were given atebirin alone, the others had the combined atebirin and plasmoquine. In 14 of the patients the blood was not negative for parasites till 4.1 days average, in 3 (all *falciparum* infections) they persisted till the sixth day, and in the other they were numerous after the seventh.

In his conclusions the author speaks highly of the combination since it leads to speedy control of the fever, rapid disappearance of the parasites from the peripheral blood and none of his patients showed any toxic symptoms.

H. H. S.

THONNARD-NEUMANN (E.). Ueber Behandlung der natürlichen Malaria mit Atebrin in Columbien. [*Treatment of Malaria with Atebrin in Columbia.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. July. Vol. 36. No. 7. pp. 357-372.]

At the suggestion of Prof. MÜHLENS the author treated 60 cases of malaria with atebirin alone or in combination with plasmoquine. Of the 60 cases, 49 were males and 10 were females, and one a child. The varieties of parasites were: 44 *P. falciparum*, 10 *P. vivax*, 6 a mixed infection of *P. falciparum* and *P. vivax*. The toxic effects noted after administration of the drugs were: yellow coloration of the skin of the white races; this disappeared in 2 weeks after cessation of treatment.

Abdominal pain, doubtless due to the plasmoquine, as it did not occur in cases treated with atebtrin alone. The author concludes from his observations, which are fully set forth in tabular form, that atebtrin is a powerful antimalarial drug and its clinical effects are excellent, even in cases of severe malignant tertian infection. The parasitocidal effect is especially on the ring forms. The action on the crescents in the doses given appears to be provocative. The combination of atebtrin with plasmoquine caused in most cases a rapid disappearance of crescents. After $3\frac{1}{2}$ months no relapses have been noted in his 60 cases. The doses employed were : atebtrin 0.1 gm. in tablets thrice daily after food for 5 consecutive days. The tablet of atebtrin and plasinoquine contained atebtrin 0.1 gm., plasmoquine 0.01 gm., and was given in the same manner.

E. D. W. Greig.

NAPIER (L. Everard), BUTCHER (Dorothy) & GUPTA (C. R. Das).
Field Experiments with Atebrin and Plasmochin.—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 186-191.

These observations were made at the Oxford Mission Settlement at Behala, where 50 out of 111 persons were found to be suffering from malaria. Plasmoquine was given in the very small dose of 0.01 gram, three times a week, to 46 persons. [The dose given by JAMES, this *Bulletin*, Vol. 28, p. 973, was 0.06 gm. daily for six days.] The result was the occurrence of more malaria among those taking prophylactic plasmoquine than among those who were not ; the drug, in these small doses, appeared to have a provocative effect. Thirty-five cases of malignant tertian and 13 of benign tertian were given a four-day course of atebtrin, followed by a three-day course of plasmoquine. Five of the malignant, and two of the benign tertian cases relapsed during the next two months ; but re-infection could not be excluded.

W. F.

DRENOWSKI (Angel K.). *Therapeutische Versuche an Malariakranken mit Atebrin und Plasmochin.* [Therapeutic Tests with Atebrin and Plasmoquine in Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. July. Vol. 36. No. 7. pp. 373-377. With 3 charts in text.

The author, who is the Director of the Malarial Institute in Burgas, Bulgaria, treated about 80 cases of malaria. He had accurate data for 57 which were divided into : malignant tertian, 6 ; benign tertian, 43 ; malignant and benign tertian, 8. After determination of the parasites in the blood each patient received 0.1 gm. atebtrin combined with 0.01 gm. plasmoquine thrice daily for 6 days. The drugs were well tolerated, pain in the abdomen being occasionally complained of. The author noted that the combination of atebtrin and plasmoquine, with very few exceptions, brought about a complete cessation of fever in 13 days. In order to produce complete destruction of gametocytes it is necessary to give after the completion of the 6-day course, a further course of plasmoquine alone, one tablet twice daily for 5 days. For the mass treatment of malaria in severely infected areas the combined treatment is preferable to treatment with quinine since the duration is shorter.

E. D. W. Greig.

STRICKLAND (C.) & ROY (D. N.). **The Behaviour of Plasmodia in the Mosquito after Treatment of the Human Host with Atebrin.**—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 191–192.

Ten *A. stephensi* were fed on a patient during the last day of his four-day course of atebrin. Though his blood contained 200 crescents per cc., none of the mosquitoes became infected. Another batch was fed on the following day and, on this occasion, a few became infected. On the fourth day after the conclusion of treatment yet a third batch was fed, this time with full success. The authors conclude that atebrin prevents the development of gametocytes imbibed by a mosquito from a patient under treatment, and partly inhibits it on the day after treatment, but has no effect three days after treatment. (See GREEN above.) W. F.

PIEBENGA (P. J.). De malaria-epidemieën in het Geneeskundig Gesticht te Franeker en de gunstige invloed der chinoplasmine-behandeling. [**Malaria Epidemics in the Asylum at Franeker and the Satisfactory Effect of Quinine Plasmoguinine Treatment.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. Apr. 2. 76th Year. No. 14. pp. 1564–1578. With 3 figs. (1 on a double plate). English summary.

During the years 1928–1931 trial was made in Holland of different methods of treatment of malaria. These methods were the long and the short quinine and the combined quinine plasmoguinine treatments. The long quinine treatment consisted of 1 gm. quinine sulphate for 14 days and then every 4 days for 3 months. In the short method the quinine was given for 7 days only: in the event of a relapse the treatment was repeated and finally after a fortnight 1 gm. quinine for 5 days as a prophylactic. The third method was by chinoplasmine tablets, one three times daily for 14 days. These tablets contain 300 mgm. quinine sulphate and 10 mgm. plasmoguinine. Quite definite results were obtained. The long and the short quinine methods did not prevent relapses, whereas with chinoplasmine few or no relapses took place. A careful control of the administration of these tablets must be exercised, but except for this necessary precaution against toxic action the patient need not remain in bed. W. F. Harvey.

MANSON-BAHR (Philip). **The Therapeutic Effects of Plasmoguinine in Pregnancy.**—*Lancet.* 1932. Apr. 23. pp. 882–883. [12 refs.]

The author has found the combination of quinine and plasmoguinine well tolerated by pregnant women and unattended by danger to either mother or child in all three clinical varieties of malaria. He recommends a dose of "four tablets of the standardised product daily (0.04 gram of plasmoguinine plus 0.5 gram of quinine sulphate) for 5 separate weeks with a pause of 3 days interval between each weekly course."

W. F.

MANWELL (Reginald D.). **Quinine and Plasmochin Therapy in *Plasmodium rouxi* Infections, with Further Notes on the Effects of these Drugs on the Other Avian Malaras.**—*Amer. Jl. Trop. Med.* 1932. Mar. Vol. 12. No. 2. pp. 123–147. [17 refs.]

Continuation of work recorded in this *Bulletin*, Vol. 28, p. 600.

"The work herein described has had for its object the solution of the problem as to whether the two species of avian plasmodia most refractory

to treatment could be more successfully treated with a combination of plasmochin and quinine, than with either drug used separately, and further investigation of the effect of plasmochin upon *Plasmodium elongatum*, shown in previous work to be very highly susceptible to plasmochin. *Plasmodium rouxi*, an Algerian species, has also been studied with reference to its chemotherapy and the results compared with those obtained by the same methods on the other three species. The question of the reliability of splenomegaly as an indication of malarial infection has also been investigated. A total of 120 cases have been treated, 44 have been used as controls, and 101 others have been used in testing for sterilization and in other ways. Allowing for duplications, 223 birds have been used. The following conclusions seem justified :—

" 1. Infections with *Plasmodium praecox* and *Plasmodium cathemerium* cannot be more successfully treated with a combination of plasmochin than with either drug separately, or at least such an advantage, if it exists, is slight. The results obtained in these researches gave no suggestion that such a superiority obtains.

" 2. Wide differences have been shown to exist in the susceptibility of different birds to treatment, when infected with *Plasmodium elongatum*, and these are interpreted as meaning that the effect of the drug used—plasmochin—is exerted indirectly, through a stimulation of some sort to the natural defensive powers of the host, as well as directly upon the parasite. In general, about four days of treatment appear to be necessary to prevent the development of the infection when started immediately after inoculation, and about twelve days appear to be required for sterilization when administration is deferred until parasites are evident in the blood.

" 3. Plasmochin exerts a direct plasmodicidal action, when parasites belonging to the species *elongatum* are exposed to the drug *in vitro*, but the action is slow and apparent only after a number of hours. Morphological changes are produced more quickly in the parasite than are changes in infectivity.

" 4. *Plasmodium elongatum* infections are less easily treated with plasmochin after they become chronic, but it is certain that the parasite level is forced down to a very low level—so low that the blood is no longer infective to clean birds—and that the level remains at this low point in most cases for at least two weeks, even though it is not fully demonstrated that sterilization occurred.

" 5. Infections with *Plasmodium rouxi* are as susceptible to plasmochin as are those of *elongatum*, and more susceptible to quinine than any of the other three species. Sterilized cases are as readily reinfected as when infected the first time.

" 6. The parasite-level establishes itself at a much higher point with chronic cases of *Plasmodium rouxi* than in chronic cases of any of the other three species studied.

" 7. Splenomegaly is not a trustworthy means of diagnosis in avian malaria, particularly chronic cases, since it may be absent, even when parasites are easily demonstrable in the blood, and is often present in birds dying from other causes and known to be, and to have always been, free from malaria. Even the colour of the spleen is not a reliable indication, unless it is very dark."

W. F.

LEVENSON (E. D.). Contribution à l'étude de l'action de la plasmoquine sur la sécrétion du suc gastrique. [Action of Plasmoquine on Secretion of Gastric Juice.]—*Trop. Med. & Vet.* Moscow. 1931 Vol. 9. No. 2. pp. 70–74. [In Russian. French summary p. 74.]

The author records experiments on the effect of plasmoquine on the secretion of gastric juice. Preliminary tests were made on *in vitro*

digestion of egg-white in Mett's capillaries in the presence of plasmoquine, which was found to have practically no effect upon the digestion of the protein by pepsin. Further experiments were conducted on human beings. The gastric juice was collected twice from each patient by means of a duodenal sound: once after a control "meal" consisting of 2 per cent. solution of methylene blue in 300 cc. of distilled water, the second time after a similar "meal" to which 0.02 gm. plasmoquine was added. In this manner sixteen persons were examined. It was found that in eleven cases there was an increase in the total acidity of the gastric juice, in seven there was an increase of free hydrochloric acid, and in six the digestive power of the gastric juice was augmented. On two occasions only was there a decrease in the digestive power of the juice. It is concluded that in most cases plasmoquine introduced *per os* stimulates the production of hydrochloric acid and the digestion of proteins.

C. A. Hoare.

HENRY (Thomas Anderson). **The Standardisation of Mixtures of Cinchona Alkaloids.**—*Riv. di Malariologia*. 1931. Nov.-Dec. Vol. 10. No. 6. pp. 713-719.

The original quinetum consisted of the total alkaloids extracted from the red bark of *Cinchona succirubra*, which was the tree grown on the British Indian plantations. These trees yield but little quinine, and, in 1874, at the suggestion of Dr. J. E. de VRIJ, quinetum was prepared from their bark in factories attached to the government plantations, instead of sending it to Europe. However the *C. succirubra* trees were gradually displaced by other varieties yielding more quinine and, by 1887, the Indian factories were able to manufacture the sulphate. By 1903, so little red bark was grown that quinetum could no longer be prepared and, in its place, there was put on the market a mixture of the alkaloids of the new barks; in this case, however, not the total alkaloids, but those which remained after the quinine had been extracted. A certain amount of quinine was added to this mixture to make it approximately similar to the original quinetum, and it has since been known as cinchona febrifuge. It is made in India, Java, England and elsewhere; there is no recognized specification, its content of alkaloids varies within wide limits, and it therefore does not approach de Vrij's quinetum in quality and reliability. Some samples consist of artificial mixtures of the alkaloids in various proportions. In order to remedy this state of things, the Malaria Commission of the League of Nations has accepted the recommendations of a conference of pharmacological and chemical experts, held under its auspices at Geneva in May 1931, and reproduced in this *Bulletin* (*ante*, p. 461).

W. F.

MANCA (S.). Il chineto nella cura della malaria. (**Quinetum in Treatment of Malaria.**)—*Riv. di Malariologia*. 1931. Nov.-Dec. Vol. 10. No. 6. pp. 720-742. [10 refs.] English summary (9 lines) p. 806.

This is an important article and only further trial can decide whether the claims made on the basis of so few cases can be sustained. The sub-committee of the League of Nations Malaria Commission has concluded that "the name 'Quinetum' should be reserved for a preparation consisting of quinine, cinchonidine and cinchonine in equal parts,

that being approximately the normal proportion of these alkaloids in *Cinchona succirubra*."

The author of this paper mentions two official [chineto di Stato] forms for oral administration: No. 1 containing, in percentages, 37 sulphate of quinine, 37 sulphate of cinchonidine, 25 sulphate of cinchonine; and No. 2 containing 29, 45.5, and 25 [52 is given in the text, but is obviously a mistake] per cent. and in either case "a limit of 5 per cent. of secondary alkaloids, quinidine, hydroquinine, cinchonine, etc." There is also a State preparation for subcutaneous injection put up in phials of 1 and 2 cc., containing 0.5 and 1 gm. of quinetum respectively [but which form is not specified].

The author describes in detail 22 cases, 7 of benign tertian infection, 10 of subtertian and 5 of both, stating in each case the condition of the blood, and the spleen and results during the courses of treatment and afterwards, the preparations used, their doses and the intervals between them. These facts can only be summarized here. Five patients (2 benign and 3 malignant tertian) were given the drug orally in doses (usually divided) of 1-2 gm. daily, for periods up to 32 days; the other seventeen were given injections, usually 1.5 gm., and occasionally 2 gm., in divided doses for 5 days, followed by oral administration, 1.5 gm. daily for a fortnight and thereafter 1 gm., the whole stay in hospital varying between 25 and 40 days. In practically all the fever came down promptly, parasites disappeared from the circulation within a week, the spleen rapidly decreased in size, the anaemia improved, in some to the extent of a million red cells per cmm. in a week or so. One gram was not sufficient either *per os* or *per cutim*, 1.5 was usually an adequate dose. Symptoms such as tinnitus, deafness, amblyopia and tremor, common after quinine, were evidenced only by slight tinnitus and tremor, neither of which caused any real trouble. Except in severe cases—pernicious malaria—1.5 to 2 gm. by mouth daily is recommended, the injections being reserved for the serious stages and followed after a few days by oral administration. None of the author's patients showed any idiosyncrasy.

H. H. S

GROOTHOFF (A.). Quelques observations sur le problème du quinetum. [The Problem of Quinetum.]—*Riv. di Malariaologia*. 1931. Nov.-Dec. Vol. 10. No. 6. pp. 703-712. English summary (8 lines) p. 806.

The author was formerly a director of the government cinchona plantations in the Dutch East Indies. He discusses the League's proposals with regard to Totaquina [*ante*, p. 461]. Many malarious countries contend that they are unable to provide sufficient quinine for their people because the price is too high. This is why the Health Section of the League of Nations has interested itself in quinetum and totaquina, and why it hopes to increase the amount available, by extending the planting of cinchona, especially those varieties rich in total alkaloids. The author discusses the economic aspects of this proposal and begins by outlining the history of cinchona cultivation, and its salvation by the quinine convention (see de VOGEL above). At present 95 per cent. of cinchona producers are affiliated to the Kina Bureau which is established at Amsterdam and is composed of representatives of the planters and the manufacturers. The present price is 37.50 florins for a kilogram of quinine sulphate; of this the planter receives 18, and the manufacturer 19.50. The author thinks that 25

florins would be a fair price. The Dutch Indies produce 10,000,000 kilograms of bark, the British Indies 850,000, and other countries 250,000. The Dutch Indies can provide from their bark 630,072 kilograms of quinine sulphate, and 161,893 of quinetum containing 19·7 per cent. of quinine. The rest of the world can supply 93·830 kilograms of quinetum. The total world supply is therefore 630,672 of quinine and 255,723 of quinetum. If one wishes to increase the supply of quinetum by 100,000 kilograms, it will be necessary to bring 1,465 hectares of plantations into bearing, which will require much capital and careful selection of soil. Moreover the plantations of Java have only been kept going by regulating the supply to the demand ; this demand has not increased during recent years, and some plantations have gone out of cultivation. It does not seem good business to plant up fresh areas elsewhere ; a great slump in prices has always meant a great decrease in output and, later on, high prices ; consequently such a policy will not help malarious countries. Moderate prices and an assured market mean a steady supply.

W. F.

ST. JOHN (J. H.). **Quinine Analysis of the Blood with Reference to the Treatment of Malaria.**—*Amer. Jl. Trop. Med.* 1932. Mar. Vol. 12. No. 2. pp. 101–116. With 7 text figs.

Some people do not develop and maintain such high concentrations of quinine in their blood as others. This may explain why some people are harder to cure than others. Continued administration in the same doses does not necessarily result in increased concentration of quinine after the first 24 hours. If 1·950 grams (30 grains) are given by the mouth in capsules, the maximum concentration of about 6 mgm. per litre of blood is reached in approximately 1 hour, and is maintained for about 8 hours. With smaller doses it takes longer to reach this concentration. A dose of 650 mgm. (10 grains) every 8 hours, produced a concentration of 6 mgm. per litre, 1 hour after the second dose, and then maintained it. A dose of 5 grains every four hours produced the same concentration, but it took 24 hours, or four doses, to do so. The maximum once reached could be maintained by this small dose as long as desired. The highest concentration was obtained by 10 grains every four hours, and was above 10 mgm. per litre in most cases ; this can be maintained for 4 or 5 days. High concentration can be reached more speedily by giving the first three doses at two-hourly intervals.

W. F.

ALESSANDRO (Antonio). L'adrenalina nella cura della splenomegalia malarica cronica. [**Adrenalin in Malarial Splenomegaly.**]—*Riv. Sanitaria Siciliana*. 1932. Mar. 1. Vol. 20. No. 5. pp. 332, 335–338, 341–342. English summary (6 lines).

The author administered adrenalin intravenously to 7 patients with splenomegaly due to chronic malaria, starting with 1/100 mgm., then proceeding with 1/80, 1/70 and so on to 1/20 or, if tolerated, to 1/10 mgm.—some 2–3 mgm. being given altogether. He noted the effects on the splenic enlargement, on the haemopoiesis, and on the general state. He gives details of each of the 7 cases ; in 3 the spleen reached to the level of the umbilicus and in none was it less than 3 fingers' breadths below the costal margin. In four (one of whom had a spleen to the umbilical level) the spleen returned to normal ; in all it was much reduced. The red corpuscles which before treatment were 2·5 to 3

million per cmm. increased by a maximum of 2,100,000 and a minimum of 800,000, and the leucocytes by 300 to 1,800; haemoglobin increased by 8 to 30 per cent. The weight increased by 1.9 kgm. in the least to 7.1 kgm. in the greatest. The number of injections varied from 30 in 45 days to as many as 55 in 12-13 weeks. All the patients showed improved appetite and stated that they "felt much better." [No mention is made of any treatment other than the adrenalin injections.]

H. H. S.

LOTZE (Harald). Die künstliche Proteosomainfektion der Vögel. 3. Mitteilung. Ein Beitrag zur Frage der Therapie bei Vogel-malaria. [**Therapy of Bird Malaria.**—*Zent. f. Bakt.* I. Abt. Orig. 1932. Mar. 30. Vol. 124. No. 3/4. pp. 161-167. With 5 charts in text.

A series of birds infected with proteosoma received from the 2nd to the 6th day of the infection the following forms of treatment :— (1) 0.1 cc. blood taken from the wing vein and immediately injected into the same bird subcutaneously (autohaemotherapy). (2) 0.1 cc. blood taken from another infected bird and injected intramuscularly. (3) 0.05 cc. serum, obtained from blood taken at the height of infection from a bird that had been killed, injected intramuscularly. (4) 0.1 cc. of a suspension of blood corpuscles in normal saline, made from blood taken at height of infection from a bird that had been killed, injected intramuscularly. Charts illustrate the course of the experiments. He concludes that :—The treatment of bird malaria by autohaemotherapy is, on technical grounds, unworkable. Results of treatment were better with fresh serum of infected animals and a suspension of infected blood cells in normal saline; in the latter therapy there was complete disappearance of the parasites from the tissues of the animals. Reports of similar therapeutic procedures in human malaria appear to support the results of the experiments.

E. D. W. Greig.

- i. TRENSZ (F.). Essai d'application de la réaction de Henry à l'étude épidémiologique du paludisme. [**Henry's Reaction in the Study of Malarial Epidemiology.**—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 310-314. With 1 chart in text.
- ii. —. La réaction de Henry ("séroflocculation palustre") et la "surflocculation" de certains sérums de paludéens. [**Henry's Reaction. Superflocculation with Certain Malarial Sera.**—*Ibid.* pp. 314-317.

i. The instability of the blood proteins shown by Henry's reaction does not depend upon the intensity of infection. When the reaction was tested in a native village, it was found that there were fewer positives in the malaria season than before it, and that there were fewer positives in children than in adults, though malaria tends to cure itself with age. The splenic index must remain the method of choice in an epidemiological survey.

ii. Sometimes the control tubes in Henry's reaction (which contain serum and distilled water, without antigen) show a flocculation, which Henry calls "surflocculation." Such superflocculation occurs especially with sera giving a positive reaction in the tubes of test which contain serum, antigen, and salt-solution; the stronger the positive reaction, the greater the superflocculation. If a guineapig is inoculated with

trypanosomes its serum gives a positive Henry's reaction soon after the appearance of the parasites in its blood. As the infection advances the reaction becomes more intense, and eventually flocculation occurs in the control tubes without any antigen. The author concludes that the two reactions, namely that with the antigen and that without it, are both due to the same change in the serum, and that the difference is only one in degree. Marcel LEGER remarked, in the discussion following the first paper, that as the author had shown that a positive reaction followed infection with a protozoon (trypanosome) which produced no pigment, Henry's melanin could no longer be regarded as a specific antigen.

W. F.

TRENSZ (F.). Le rôle du pH des réactifs dans la séroflocculation du paludisme (réaction de Henry). [**The pH of the Reagents in Henry's Reaction.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 221-224. With 1 text fig.

This presents no difficulties, since the reaction takes place over the wide range of pH 5.4 to pH 9.0. The optimum appears to be that which coincides with a minimal molecular concentration, that is to say, pH 7 of distilled water.

W. F.

LIVIERATO (S.), VAGLIANO (M.) & CONSTANTAKATO (G.). Utilisation d'un nouvel antigène pour le diagnostic de la malaria par la méthode de flocculation. [**A New Antigen for the Flocculation Test in Malaria.**]—*C.R. Soc. Biol.* 1932. May 13. Vol. 110. No. 16. pp. 26-27.

In place of Henry's antigen which is made from the pigment of an ox's eye, the authors have prepared one from the sac of a cuttlefish with equally good results.

W. F.

ELLER (Karl). Serologische Untersuchungen bei Tertiana-Impf-malaria an luesfreien Patienten. [**Serological Investigations on Inoculation Malaria in Non-Syphilitic Patients.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 3/4. pp. 397-420.

As a result of his investigations the author reaches the following conclusions:—(1) Serological investigations with the usual methods and technique for the diagnosis of syphilis give positive results in malaria in persons not suffering from syphilis and the reactions cannot be distinguished from the positive reactions of syphilis. This applies to infection both by mosquitoes and inoculation. (2) By the use of the Meinicke turbidity reaction, however, the results are different. It appears that the reaction products in the serum of patients suffering from syphilis and malaria show quantitative and qualitative differences. In malaria they are not identical with immune bodies as in syphilis. (3) He considers the further pursuit of this study will be of interest clinically for differential diagnosis of malaria and syphilis not only in the tropics, but in the use of malarial therapy, and also for the elucidation of the nature of serological reactions.

E. D. W. Greig.

TSECHNOWITZER (M. M.) & MOLDAWSKAYA-KRITSCHESKAYA (W. D.).
The Intracutaneous Test in Malaria.—*Trop. Med. & Vet.* Moscow.
1931. Vol. 9. No. 6. pp. 261–264. [In Russian. English
summary.]

Having failed in their attempts to obtain a skin reaction with antigens contained in the plasma and serum of malarious patients, the authors prepared an antigen derived from the plasmodia and the products of their metabolism contained in the red cells. 5 cc. of blood, taken from the vein during an attack and containing 10–15 parasites per field in a thick film, are diluted in 250 cc. distilled water. The mixture is thoroughly shaken and left for 24 hours at room temperature. The fluid part of the mixture is then removed, the sediment is poured into sterile 40–50 cc. test-tubes and centrifuged. The supernatant fluid is decanted and the sediment repeatedly washed until the fluid is colourless. The sediment is then made up to its original volume with distilled water, the resulting mixture representing the stock solution of antigen. It is warmed in a water bath to 56°C. and 0.25 per cent. carbolic acid is added to it. After diluting the solution by 32, 64 and 128 volumes it was used for the reaction, 0.1 cc. being injected intracutaneously. To this antigen the name “malaren” was given.

Another antigen, named “haemo-antigen” or “haemomalaren,” was prepared according to HERMAN and LIFSHÜTZ (*Kazan Med. J.* 1929, No. 12): malarial blood was diluted with distilled water, 1 : 50, and boiled; 0.5 per cent. carbolic acid was then added to the cooled mixture. 0.1 cc. of this antigen was employed for the skin reaction in dilutions of 1 : 5,000 and 1 : 10,000. The authors also employed a mixture of the two antigens (“complex” antigen) in their respective doses. Blood containing *Plasmodium vivax* and *P. falciparum* was used. Analogous preparations from the blood of healthy subjects were used as controls.

The intracutaneous injection was made on the inner-surface of the arm. After the administration of the antigen a swelling (bulla) 7.8 mm. in diameter, appears at the site of injection. The skin reaction was estimated twice: after 24 and 48 hours. In positive cases there is a hyperaemia extending over an area from 8 to 50 mm. in diameter, sometimes accompanied by haemorrhages 8–12 mm. in diameter. In negative cases there is no reaction at the site of injection.

The test was applied to 85 cases of malaria and to 49 control subjects. The reaction was positive in 92.7 per cent. of cases with parasites in the blood, in 88 per cent. of chronic cases, in 53.9 per cent. of cases with a history of malaria in the past, and 15.5 per cent. in controls. The best results were obtained with the “complex antigen.” The reaction is not specific to the different forms of malaria. C. A. Hoare.

DE LANGEN (C. D.). Polynucleaire leukocyten bij de phagocytose van malariaparasieten. [**Polynuclear Leucocytes concerned in the Phagocytosis of Malaria Parasites.**]—*Geneesk. Tijdschr. v. Nederl. Indië*. 1932. June 7. Vol. 72. No. 12. pp. 793–794. With 2 figs. on 1 plate.

In two cases of subtertian the author noticed phagocytosis of the merozoites by young polynuclear leucocytes. Whether this occurs regularly in certain stages of the attack or only in cases in which the parasites are very numerous is undecided. Hitherto only monocytes were known to take part in the phagocytosis of the parasites.

The author's staining method is the following :—

A drop of blood is taken from the finger tip, which is previously covered with a drop of 1 per cent. brilliant kresyl blue, pH 7. The drop is immediately mixed with the stain and left for two minutes. Then an ordinary blood film is made from the mixture which after fixation by methyl alcohol is stained again with Giemsa solution.

The photograph looks convincing.

W. J. Bais.

KONSTANSOW (S. W.). [The Nature of Schüffner's Dots in Red Cells in Malaria.]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 6. pp. 264-267. [In Russian.]

The author states that Schüffner's dots can be invariably produced by addition of 0.02-0.04 per cent. sodium carbonate to the ordinary Giemsa solution with which the blood film containing *Plasmodium vivax* is stained. He believes that the stippling is brought about by a change in the dispersion of the colloidal solution of the stain, resulting in the precipitation of the liquid dispersed phase in the form of drops. The phenomenon is caused by the introduction of the electrolyte (Na_2CO_3). To explain why the phenomenon is produced only in *P. vivax*, the author supposes that the products of metabolism of the latter have the same coagulating effect as the sodium salt.

C. A. Hoare.

WATS (R. C.) & WHITE (W. I.). The Malarial Pigment (Haemozoin) in the Spleen.—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 945-950.

Paraffin sections containing malarial pigment were treated with xylol to remove the paraffin, alcohol to remove the xylol, and water to remove the alcohol; they were then subjected to the action of various chemicals and the action on the pigment was noted. The pigment was not dissolved by acids or acid alcohol, nor by fat-solvents such as ether and chloroform; it was bleached by hydrogen peroxide. It was completely dissolved by alkalis such as normal soda. It became brown when the alkali was first poured on; and turned red if acid were substituted for the alkali before solution took place. The authors regard this as a specific test for haemozoin in the tissues.

W. F.

GREEN (Richard). Notes on the Use of Thick Blood Films in the Diagnosis of Malaria.—*Bull. Inst. Med. Res. Federated Malay States.* 1931. No. 1. 10 pp.

Dry the thick film in an incubator for 2 hours, or at room temperature for at least 8 hours. Stain film before it is 24 hours old. The solutions required are :—

(a)

Azur II-Eosin	...	...	...	...	3.0 gram.
Azur II	...	...	...	...	0.8 "
Glycerine (pure)	...	...	...	...	250 cc.
Methyl Alcohol	...	...	...	...	250 cc.

Or, alternatively, one Soloid (B.W.) Eosin-Azur ground up, and dissolved in 5 cc. of equal parts of glycerine and methyl alcohol.

(b)

Buffered solution consisting of:—

Potassium dihydrogen phosphate	...	1 gram.
Disodium monohydrogen phosphate	...	2 „
Water	... ..	1 litre

The slides are placed on their edges in a staining trough. The stain is prepared by mixing the two solutions in the proportion of one drop of (a) to three drops of (b). Sufficient is prepared to fill the trough until the slides are immersed. Stain for one hour; remove and dip gently in tap water five or six times. Tilt slides almost vertically to dry. Use no blotting paper.

[Copies of full instructions can be obtained from the Institute for Medical Research, Kuala Lumpur, F.M.S.] W. F.

NAPIER (L. Everard), KRISHNAN (K. V.) & LAL (Jemadar Chiranji). **Cytological Studies of the Blood and Tissues in Kala-Azar and Associated Conditions. Part III. Large Mononuclear Cells in Human Malaria.**—*Indian Med. Gaz.* 1932. Mar. Vol. 67. No. 3: pp. 135–139. With 2 charts in text. [10 refs.]

The blood cells were stained by a method of supravital staining; details of this method will be published later. An excellent coloured plate is given, and also a table comparing the different characteristics of lymphocytes, monocytes, and histiocytes. One of the beneficial functions of antimalarial drugs (quinine, plasmoquine, and atabrin) appears to be the production of an increase of both the monocytes and the histiocytes, and a stimulation of their phagocytic activity. W. F.

SM

1. NILO (R.) & VAN DER HOUT (O. H.). Het verband tusschen in melasse-liquidatie in irrigatie-leidingen en malaria; de ecologie peim *Anopheles aconitus*. [The Connexion between the Liquidation of Molasses into Irrigation Canals and Malaria; the Ecology of *Anopheles aconitus*.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. inculat. 21. Vol. 72. No. 13. pp. 842–850. [10 refs.]

infection. Association of molasses caused the sugar factories of East Java treponema, it, the easiest way being to sluice it into irrigation canals. and yaws in malaria carrying mosquito of East Java is *A. aconitus*. resulting mut. is as well as of other species of Anophelines were found

The possibility of numbers in irrigation water containing 1:1,000 disease by means of samples from the vicinity containing no molasses. Manifestations of (1). (pH 8.3), is rendered acid (pH < 7) by the addition of a small consideration. In accordance with other observations the author. (30). As larvae prefer water with little organic matter (N.) & ...

From an ... as well as from an agricultural point of view the addition of molasses to the irrigation water of the rice fields appears to be a favourable factor. W. J. Bais.

EJERSITO (Antonio) & LAUREL (Alberto G.). **Report on the Malaria Survey of the Proposed Negative Barrio at Malaking Patag (Cogonal Grande), Cullon Island.**—*Monthly Bull. Philippine Health Serv.* 1931. Sept. Vol. 11. No. 9. pp. 467–479. With 1 map & 2 figs. on 1 plate.

“*Anopheles* larva density cannot and must not be held as criterion for the adult density thereof. . . . *A. funestus* larvae were rated only as 9 per cent. against 91 per cent. *A. barbirostris* larvae, *A. funestus* adults were 95 per cent. as against 5 per cent. *A. barbirostris* adults.” W. F.

SAMBON (M.). Les index malarien, gamétien et splénique chez l'indigène adulte. [The Parasite, Gametocyte and Splenic Indices in Adults.]—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 241-244.

The parasite index of adults at Panda was 73, the gametocyte index was 3, the splenic index was 15.7. W. F.

MOUFEL (P.). [Bibliography of Russian Works on Malaria.]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 10. pp. 506-526. [In Russian.]

A list of 1,049 Russian publications on malaria, in continuation of those previously noted in *Trop. Dis. Bull.* C. A. Hoare.

ALESSANDRINI (Mario). Relazione su alcuni casi di malaria primitiva autoctona nel comune di Ancona. (On Some Cases of Primary Autochthonous Malaria in Ancona.)—*Riv. di Malariaologia.* 1932. Jan.-Feb. Vol. 11. No. 1. pp. 30-34. English summary p. 133.

AUBERTIN (Charles). Paludisme et leucémie myéloïde.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Mar. 28. 48th Year. 3rd Ser. No. 11. pp. 435-438.

BABLET (J.). A propos d'un cas d'accès pernicieux palustre à forme pseudo-léberbérique.—*Arch. Insts. Pasteur d'Indochine.* 1931. Apr. No. 13. pp. 73-80. With 1 chart in text & 4 coloured figs. on 2 plates.

BOYD (J. E. M.). Malaria in India.—*Jl. Roy. Army Med. Corps.* 1932. Feb. Mar. & Apr. Vol. 58. Nos. 2, 3 & 4. pp. 81-91; 177-194; 248-26 [24 refs.] (n)

BURKE (G. T.). A Case of Malaria with Cerebellar Localization.—*Indian 19. Gar.* 1932. Apr. Vol. 67. No. 4. pp. 197-198.

CAWSTON (F. G.). The Present Problem of Malaria in Natal.—*Jl. Trop. & Hyg.* 1932. June 15. Vol. 35. No. 12. p. 185.

CIUCA (M.). Work of the Malaria Commission of the League of Nations to Chinese Med. *Jl.* 1932. Apr. Vol. 46. No. 4. pp. 412-424. various

COLOMBO (U.). La prophylaxie individuelle antimalarienne parmi la population européenne d'Elisabethville (Katanga).—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 31. Vol. 11. No. 4. pp. 373-385. various

COULON (G.) & SAUTET (J.). Les rechutes à longue échéance dans la malaria. *C. R. Soc. Biol.* 1932. May 6. Vol. 109. No. 15. pp. 111-112. It was

DUCASTÉ (Maurice). L'impaludation cérébrale.—*Bull. Soc. Méd. Indochine.* 1932. Apr. 12. 96th Year. 3rd Ser. Vol. 107. No. 14. pp. 111-112. It was

EGYPTIAN GOVERNMENT. Anti-Malaria Commission. *Ann. Soc. Méd. Indochine.* 1932. Mar. 12. 96th Year. 3rd Ser. Vol. 107. No. 14. pp. 111-112. The authors

FARINAUD (E.), TOUMANOFF (C.) & HOANG-THUY-BA. *Ann. Soc. Méd. Indochine.* 1932. Jan. Vol. 10. No. 1. pp. 66-87. With 1 chart. 1 folding plan.

HIYEDA (K.). Malaria in Manchuria.—*Jl. Oriental Med.* 1932. Mar. Vol. 16. No. 3. [In Japanese. English summary p. 36.]

HUDSON (E. H.). Sur le paludisme en Proche Orient.—*Bruxelles-Méd.* 1932. May 8. Vol. 12. No. 28. pp. 763-769. With 1 map in text.

KAMISAWA (Osamu) & ISHIOKA (Hiozo). Studies in the Treatment of Malaria. VI. Therapeutic Effects of Quinine administered intravenously against Malaria.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Apr. Vol. 31. No. 4 (325). [In Japanese. English summary p. 37.]

KINGSBURY (A. Neave) & AMIES (C. Russell). The Attempted Control of Malaria by Plasmoquine Prophylaxis.—*Bull. Inst. Med. Res. Federated Malay States.* 1931. No. 3. 25 pp. With 8 figs.

- KONSTANSOFF (S W) Zur Frage nach der Herkunft und der Natur der Schuffner-Tupfelung der Erythrozyten bei Malaria—*Zent f Bak* I Abt Orig 1932. June 10 Vol. 124 No 7/8 pp 454-458
- KUMM (Henry W) Observations on Two Malaria Vectors and Distribution Records of Other *Anopheles* in the States of Bahia and Sergipe, Brazil—*Ann Trop Med & Parasit* 1932 Mar 19 Vol 26 No 1 pp 1-6 With 1 map
- LÉGER (J P) Un aspect de l'endémie palustre en Emyrne—*Bull Soc Path Exot* 1932 Feb 10 Vol 25 No 2 pp 178-183 With 1 text fig
- LEGER (Marcel) Quelques documents sur l'indice plasmodial du paludisme à la Guadeloupe—*Bull Soc Path Exot* 1932 Mar 9 Vol 25 No 3 pp 211-215
- DE MELI O (Froilano) in collaboration with VERNFNCAR (Rognvira Sridora Poi) Sur la valeur des diverses méthodes de mensurations spléniques pour le dressage de cartes malariennes—Reprinted from *C R 2e Congrès International du Paludisme, Alger, 1930* Vol 1 pp. 527-548 With 2 text figs & 9 graphs
- MONIER (H M) Renseignements recueillis sur le paludisme à Thakhek (Laos) au cours d'une visite effectuée en février 1932—*Bull Soc Path Exot* 1932 May 11 Vol 25 No 5 pp 419-421
- MORIN (Henry G S) Vers la prophylaxie sociale du paludisme—*Bull Soc Méd-Chirurg Indochine* 1932 Jan Vol 10 No 1 pp 88-128 With 1 fig
- PECORI (G) & ESCALAR (G) La lutte contre le paludisme dans la Campagne Romaine en 1930—*Bull Office Internat d'Hyg Publique* 1932 Feb Vol. 24 No 2 pp 274-277
- SCHACHSUWARLY (M) Die Behandlung der Malaria mit Plasmochin—*Arch f Schiffs- u Trop-Hyg* 1932 July Vol 36 No 7 pp 378-384 [24 refs]
- SMITH (E C) A Case of Malaria with a Blood Picture Suggestive of Splenic Anaemia—*West African Med J* 1932 Apr Vol 5 No 4 pp 69-70 With 3 figs (1 coloured) on 2 plates
- UNGER (II A) Pulmonary Conditions associated with Malaria Bronchopneumycoses—*Jl Trop Med & Hyg* 1931 Apr 15 Vol 34 No 8 attei 106-108
- FURTH (Mario) Su di un caso di porpora malarica. (On a Case of Malarial inoculation)—*Riv di Malarologia* 1932 Jan-Feb Vol 11 No 1 41 With 1 chart English summary p 134
- INFECTION. (C) Sur la présence d'une variété d'*Anopheles jeyporiensis* James et son rôle dans la transmission locale du paludisme—*Bull Soc treponema* 1931 Dec 9 Vol 24 No 10 pp 958-967 With 8 text resulting mut in footnotes
- The possibilities fugues palustres—*Rev Prat Malad des Pays Chauds* disease by means Year Vol 11 No 12 pp 555-556
- MANIFESTATIONS OF 1) La plasmochine, dérivé synthétique de la quinine dans l'endémie paludisme—*Bruxelles-Méd* 1932 May 22 Vol 12 No 30
- VYAS (B N) & (B B) On the Failure of *Toddalia aculeata* in the Treatment of Malaria—*Indian Med Gaz* 1932 Apr Vol 67 No 4 pp 192-194

YAWS AND SYPHILIS.

RAMSAY (G. W. St. C.). **Yaws and Syphilis in Calabar, Southern Nigeria : an Analysis of 5,000 Sachs-Georgi Tests.**—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 149–155. With 2 graphs.

2,600 children between the ages of 4 and 16 years and 2,400 adults, from schools and out-patient departments, Calabar, were examined by Sachs-Georgi test. The incidence of positive reactions in children was 32–42 per cent. with a maximum at 6 years of age.

The author then says, “among children of sixteen years of age and under, acquired syphilis is most unlikely to occur” and thus believes the incidence of positive reactions is an indication of the incidence of yaws [a statement which is quite unwarranted unless he has *proved* that syphilis does not occur among the child population he is dealing with. Infantile acquired syphilis is very common among some native communities.]

The figure for adults rises gradually from 32 per cent. at 16 years to 50 per cent. at 40 years—due the author suggests, but without proof, to the combined effects of syphilis and yaws reinfections. [The figures adduced prove nothing beyond the fact that yaws and/or syphilis are common diseases.]

H. S. Stannus.

TAKASAKI (S.). **Zur Klinik der Frambösie im Kindesalter. [Clinical Manifestations of Yaws in Children.]**—*Jahrb. f. Kinderheilk.* 1932. Jan. Vol. 134 (3rd Ser. Vol. 84). Nos. 3/4. pp. 169–181. With 23 figs.

A general account of the clinical manifestations of yaws in children as seen by the author during the years 1919–29 spent in the islands Truk and Palau, Caroline Is., containing no new facts. A few to need notice. Emphasis is laid upon the insignificance of thirious lesions in some cases so that they pass unnoticed, also upon the fact that the patient rarely presents himself in the primary such as author in 10 years saw only 12 primary lesions. Though it was lesions on mucous membranes are denied by some observers brown established their occurrence; he has also seen of acid were conjunctivitis, keratitis and iritis in yaws. [Mucous The authors should be received with scepticism; it is not general. W. F. a lesion may “creep” over a muco-cutaneous junction or rather with healing in the skin area giving the appearance of the mucous membrane in truth, but not one originally from the mucous membrane. The same is probably true of the conjunctivitis-iritis.]

H. S. S.

FITZGERALD (G. H.) & DEY (Nepal Chandra). **Unusual Types of Primary Lesions in Yaws.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. p. 82. With 1 text fig.

The authors record three cases of primary yaw which they believe to exemplify two rare forms of initial lesion—(a) a punched out non-indurated, non-adherent ulcer of skin, resembling a gumma, (b) a large heaped-up lesion formed of crust-covered granulations between 2 and 3 inches in diameter.

[These three cases occurred in a series of 700 cases of yaws but the authors add that there were only 29 cases of primary or secondary eruption. It would therefore appear that they are not necessarily rare lesions.]
H. S. S

SCHÖBL (Otto) & HASSELMANN (C. M.). Ueber Beziehungen zwischen Framboesie und Syphilis. [**Relations between Syphilis and Yaws.**] —*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Vol. 36. No. 2. pp. 1–36 (105–140). With 8 text figs.

In this paper the authors traverse the ground already covered by SCHÖBL's articles in the *Philippine Journal of Science* reviewed in this *Bulletin*. Some of the points he makes may be restated as the matter is of considerable interest. Morphologically, culturally and by methods of staining, the treponemata of yaws and syphilis cannot be differentiated but they may be separated on the ground of their different biological behaviour in the body tissues. The organism of yaws is ectodermotropic and finds its home in the outer layers of the skin while *T. pallidum* is mesodermotropic and attacks all the organs of the body but prefers mesodermic tissues. This difference in tropism explains the different pathology in the two infections and immunity reactions, the differences in epidemiology and clinical manifestations, as well as inheritance in syphilis and not in yaws.

The immunity in these treponematoses is a real immunity which according to its degree limits the multiplication of the parasites or suppresses them altogether. With the development of a high grade homologous immunity in either there is also a heterologous immunity to the other. Heterologous immunity develops later than homologous immunity, immunity showing itself by a lengthening of the incubation period and change in the reaction capacity of the tissues to subsequent attempted reinoculation. When complete immunity is established further progress in the disease is prevented; reinoculation and superinoculation fail. Resistance to infection is not due to a so-called latent infection. Immunity may be produced by inoculation with dead treponemata as antigens and they have reciprocal actions. Syphilis and yaws may be present together in the same case; the immunity resulting mutually affects the course of each disease.

The possibility of exciting immunity in early cases of treponematous disease by means of killed vaccines and thereby preventing the later manifestations of the disease and its relationship to chemotherapy need full consideration.
H. S. S.

TURNER (Thomas B.) & CHAMBERS (J. H.). **Experimental Yaws. I. Comparison of the Availability of the Rabbit and Monkey for the Isolation of Strains of Yaws.**—*Bull. Johns Hopkins Hosp.* 1932. Apr. Vol. 50. No. 4. pp. 253–269. With 4 figs. [11 refs.]

The authors propose to carry out investigations "designed to throw light upon the question whether or not yaws and syphilis are identical diseases," and "whether there is any immunological relationship between strains of spirochaetes recovered from yaws patients, on the one hand and from syphilitic patients on the other" both "*recovered in the same locality*" (Haiti). For yaws, monkeys (*Macacus rhesus*) when used were inoculated over each eyebrow by scarification and intracutaneously over each deltoid; rabbits by three methods, the

intratesticular, the intracutaneous and the deposition of the virus on a granulating wound. Transfers from 11 patients were made. For syphilis a single transfer was made from a primary genital lesion to rabbits. Fourteen out of 34 rabbits inoculated intratesticularly developed yaws lesions at the inoculation site, the incubation period being 33-108 days. Twelve rabbits inoculated intracutaneously failed to show any lesions. None of 13 rabbits in whom the inoculation of a wound had been attempted became infected. Only intratesticular inoculation succeeded in rabbits. Five monkeys were inoculated from as many patients; definite lesions were produced in 2, questionable lesions in 3 but treponemata were never recovered.

[These results are very disappointing to the authors but they seem satisfied with the rabbit as an experimental animal. This is a pity for obvious reasons and because more work along the lines of the investigations of SCHÖBL is needed.] H. S. S.

MIYAO (Isao). **Experimental Inquiry into the Possibility of Transmission of Yaws by Leeches.**—*Philippine Jl. Sci.* 1932. Apr. Vol. 47. No. 4. pp. 463-466.

The experimental evidence concerning the indirect transmission of yaws has been gathered from the available literature and critically discussed by YASUYAMA (*Philippine Jl. Sci.* 1928, Vol. 35, p. 333). Leeches are mentioned as possible vectors. Leeches were allowed to ingest lymph and blood exuding from monkey yaws lesions. At definite intervals, the entire blood content of each leech was taken up in a hypodermic syringe, examined microscopically and injected intradermally into monkeys. Examinations of leech blood revealed spirochaetes in 11 out of 16. Of six monkeys inoculated in none was a lesion produced, though it appeared the spirochaetes would live and possibly multiply in the leech for some short time.

The possibility of transmission by leeches is very remote. H. S. S.

HU (Ch'uan-K'Uei) & FRAZIER (Chester N.). **Isolation of *Treponema pallidum* from Juxta-Articular Nodules.**—*Proc. Soc. Experim. Biol. & Med.* 1932. June. Vol. 29. No. 9. pp. 1167-1168.

The authors open with the statement—"The syphilitic nature of the J.A.N. occasionally seen in syphilitic patients is generally accepted principally because of the prompt response of the lesions to arsphenamine therapy." Mention is then made of the usual failure to demonstrate spirochaetes in these lesions by dark-field illumination method or in stained sections. Animal inoculation has been credited with a single success (JESSNER and ROSSIANSKY, *Arch. f. Dermat. u. Syph.* 1930, Vol. 160, p. 224). The authors now report one success in two attempts. The man was infected 12 years before, chancre and positive W.R. and Kahn test. He exhibited "several, small, firm, non-tender nodules in the subcutaneous tissue below both elbows and over the great trochanters." 1.0 cc. of a sterile saline emulsion of an excised nodule was injected into the testicle of two rabbits. An orchitis developed in 10 weeks, W.R. became positive and spirochaetes were demonstrated in juice aspirated from the testicular lesion. [No mention is made of the fact that perhaps yaws is a much commoner cause of J.A.N. and that many lesions presumably when old-standing and fibrous do not respond to treatment by arsenicals.] H. S. S.

- DE ARAUJO (Eduardo). Caso de boubia observado na Bahia.—Reprinted from *Cultura Med.* 1932. Mar. Vol. 2. No. 3. pp. 130-135. With 1 fig. English summary.
- BUTLER (C. S.). The Trouble with "Yaws."—Reprinted from *Amer. J. Clin. Path.* 1932. May. Vol. 2. No. 3. pp. 265-269.
- STEUDEL (Emil). Zur Klinik und Statistik von Framboesie und Syphilis.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 243-248.

CLIMATIC BUBO AND LYMPHOGRANULOMA INGUINALE.

FINDLAY (G. M.). **The Relationship of Climatic Bubo and Lymphogranuloma Inguinale.**—*Lancet.* 1932. July 2. pp. 11-13. [16 refs.]

Another link in the chain of evidence proving the identity of the condition called lymphogranuloma inguinale by DURAND, NICOLAS and FAVRE (1913) and climatic bubo. Clinically and pathologically when series of cases were examined there were no differences in the two conditions. FREI (1928) then showed that the intra-dermal reaction which he had introduced for L.I. gave positive results in C.B.; by the use of an antigen prepared from one condition he obtained positive results in the other. In 1930 HELLERSTRÖM and WASSÉN were successful in inoculating monkeys intracerebrally and passing the virus through a series of animals, experimental work confirmed and carried further by LEVADITI and his colleagues. Others obtained some successes by inguinal inoculation of guineapigs.

G. Marshall Findlay has now shown that, using sterile pus aspirated from softened glands of cases of C.B. infected in Singapore as the intracerebral inoculum in monkeys, a clinical and pathological picture is produced in those animals analogous to that produced by the L.I. antigen.

Characteristic symptoms and histological changes are also produced by intracerebral inoculation of mice as in L.I. Inguinal inoculation into guinea-pigs is followed by a characteristic adenitis as in the cases reported by MEYER, ROSENFELD and ANDERS (1931) using L.I. virus.

The affection can be passaged in monkeys and guineapigs. The virus of C.B. is filtrable as in the case of that of L.I. It remains virulent when preserved in 50 per cent. glycerine in saline at 4°C. for 7 days but not after 14 days. Unlike many neurotropic viruses the concentration of C.B. virus in infected mouse brain does not appear to be very great since dilutions greater than 1 in 1,000 failed to kill.

LEVADITI and co-workers (1932) showed that the serum of L.I. patients possessed virulicidal properties: the same has been shown to be true for cases of C.B. Further the sera of L.I. patients from Paris had similar properties for the virus derived from cases infected in Singapore.

H. S. Stannus.

GIBSON (P. L.). **The "Non-venereal" or Climatic Bubo. A Clinical Study of a Series of Cases occurring in a Naval Hospital and on Board Ship, with a Discussion of Views of Recent Authorities.**—*Brit. J. Ven. Dis.* 1931. Oct. Vol. 7. No. 4. pp. 243-275, & 1932. Jan. Vol. 8. No. 1. pp. 1-47. With 3 charts in text. [53 refs.]

Two rather unnecessarily long articles forming a comprehensive paper on this disease with 27 case histories, discussion of theories in etiology,

pathology, treatment, etc., which unfortunately is now much out of date. The paper was, it is stated in a footnote, received for publication in September, 1930, since when many observations by clinicians, pathologists and research workers have been recorded upon this affection. There is nothing essentially new in the paper except perhaps that the author believes that the prostate and vesiculae may be affected in the disease.

[It seems rather unfortunate that the author should have chosen the term non-venereal bubo as his title, for the disease is commonly communicated by sexual intercourse though not necessarily so, just as both methods of communication occur in syphilis. The author has also fallen into the trap of including the designation granuloma venereum as a synonym for this disease which is now commonly known as lymphogranuloma inguinale, though later he mentions this entirely different condition under differential diagnosis.] H. S. S.

LEVADITI (C.), RAVAUT (P.) & SCHOEN (R.). Présence du virus de la maladie de Nicolas et Favre dans les ganglions lymphatiques des singes réceptifs. [**The Presence of L.I. Virus in Glands of Susceptible Monkeys.**—*C. R. Soc. Biol.* 1932. Apr. 15. Vol. 109. No. 12. pp. 1099-1101.

The presence of the virus of L.I. in the lymphatic glands of monkeys whether inoculated into gland, intra-cerebrally or intra-preputially, has already been demonstrated by HELLERSTRÖM and WASSÉN and the present authors. The last experiments go to show that in monkeys, who do not succumb to intra-glandular or intra-preputial inoculation, the virus may persist for 12, 34 and 111 days. From the monkey thus showing persistence of virus on the 111th day, another gland was removed on the 136th day; an emulsion of this inoculated intra-cerebrally into another test animal proved innocuous. These experiments were carried out on susceptible species, *Cynomolgus* and *Cynocephalus*. A *Macacus rhesus*, relatively non-susceptible, after inguinal intra-gland inoculation developed inguinal and axillary adenopathy, but an inguinal gland excised on the 75th day showed no pathological change and an emulsion was non-infective.

H. S. S.

LEVADITI (C.), RAVAUT (P.) & SCHOEN (R.). Nouvelles données sur la maladie de Nicolas et Favre expérimentale du singe et de la souris blanche. [**Experimental L.I. in the Monkey and White Mouse.**—*C. R. Soc. Biol.* 1932. Apr. 22. Vol. 109. No. 13. pp. 1176-1179.

The results of certain further experiments are here given. The virus is not destroyed by keeping in a vacuum in an ice chest for 12 days. It will not pass through a collodion membrane of three thicknesses under a pressure of 60 mm. Hg. (rate of 1 drop every 2 min. 3 seconds) as will certain other neurotropic viruses. Further experiments were made on white mice. It was shown that after both intraperitoneal and transcranial inoculation the heart blood, liver, spleen, kidney, glands, and brain were infective when used as inocula into other white mice using intracerebral inoculation and submitting these animals to histological examination later.

H. S. S.

LEVADITI (C.), RAVAUT (P.), & SCHOEN (R.). Propriétés virulicides du sérum des sujets atteints de lymphogranulomatose inguinale (maladie de Nicolas et Favre). Utilisation de la souris comme animal-test. [**Virulicidal Properties of the Serum of L.I. Patients.**]—*C. R. Soc. Biol.* 1932. Apr. 29. Vol. 109. No. 14. pp. 1267–1269.

The authors in previous papers showed that the serum of patients suffering with L.I. possessed virulicidal properties, using intracerebral inoculation of monkeys for the test. In the present paper experiments are reported showing that the test may be made with white mice. Serum from the patient is mixed with an emulsion of virulent brain tissue previously clarified by centrifugation, 1 cc. of each. The mixture is kept for $1\frac{1}{2}$ hours at 37°C. and 17 hours at 5°C. One drop is then inoculated intracerebrally into the white mouse. Controls are inoculated with emulsion plus saline. The mice are killed (they show no symptoms) on the 24th day. All controls showed typical lesions; the others were protected. H. S. S.

CAMINOPETROS (J.), PHYLACTOS (A.) & PHOTAKIS (B.). Recherches expérimentales sur la lymphogranulomatose inguinale (maladie de Nicolas et Favre) en Grèce. [**Laboratory Studies in L.I. Infection.**]—*C. R. Soc. Biol.* 1932. June 17. Vol. 110. No. 21. pp. 445–447.

It will be remembered that HELLERSTRÖM and WASSÉN in Sweden and LEVADITI, RAVAUT, LÉPINE and SCHOEN in France found the guineapig and rabbit resistant to the virus of L.I. which was pathogenic for the monkey and white mouse while MEYER, ROSENFELD and ANDERS, FREUND and REISS in Germany worked with a virus which was pathogenic for the first mentioned animals. The authors working in Athens where they discovered 14 typical cases during the past year obtained 2 positive results in 5 attempts to infect monkeys by intracerebral inoculation, with four passages in one case. All attempts to infect guineapigs and rabbits by any method failed. A spermophile (*Cutillus citillus*) inoculated intracerebrally with gland pulp remained without symptoms but brain tissue removed after 21 days was virulent for the monkey on intracerebral inoculation. H. S. S.

HELLERSTRÖM (S.) & WASSÉN (E.). Studien über die Affinität des Lymphogranuloma inguinale-Virus zu verschiedenen Gewebssystemen beim Affen. [**Affinity of L.I. Virus for Various Tissues in Monkeys.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 73. No. 1/2. pp. 110–114.

— & —. Weitere Untersuchungen über die Natur des Lymphogranuloma inguinale-Virus. [**The Nature of L.I. Virus.**]—*Ibid.* pp. 114–117.

L.I. virus injected into the abdominal cavity of apes causes a peritonitis with or without exudation characterized by polynuclears, large and small monocytes, red blood cells and endothelioid cells. The exudate will give a Frei skin reaction and is infective for other animals. The mesentery and omentum show the same changes as those seen in human gland disease or meningitis in animals, perivascular infiltration with mononuclear and polynuclear cells. In thus infected apes the blood is virulent thirteen days after infection. Virus

is also present in the spleen after intracerebral and intraperitoneal infection. The virus can pass through the scarified skin without producing a local lesion.

In two tests L.I. virus passed Berkefeld and Chamberland filters. The virus loses its pathogenicity rapidly in ordinary undiluted glycerine. It retains its virulence in portions of brain tissue kept frozen for 22 days.

H. S. S.

HELLERSTRÖM (Sven). Neuere, wichtigere Ergebnisse auf dem Gebiete der Lymphogranuloma inguinale-Forschung. [**Recent Advances in the Knowledge of L.I.**]—Reprinted from *Zent. f. Haut- u. Geschlechtskr. s. d. Grenzgebiete*. Vol. 40. No. 11/12. pp. 705-716. [2 pages of refs.]

NICOLAU (C. T.). Behandlung des Lymphogranuloma inguinale benignum. [**Treatment.**]—*Klin. Woch.* 1932. June 4. Vol. 11. No. 23. pp. 991-994. [15 refs.]

The first article is an excellent summary upon L.I. up to date ; the second gives notes upon the many forms of treatment which have been tried in that disease, most of them without useful results but no mention is made of the use of T.A.B. vaccine intravenously as advocated by HANSCHALL.

It is impossible to further epitomize these summaries. H. S. S.

NICOLAU (C. T.). Lésions histo-pathologiques du lymphogranulome inguinal bénin chez l'homme. [**Histopathology of Benign L.I. in Man.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest*. 1932. Feb. Vol. 14. No. 2. pp. 39-50. With 8 figs.

——. Recherches expérimentales sur la transmissibilité du lymphogranulome inguinal bénin (Ni-Fa) chez les animaux. [**The Transmission of L.I. to Animals.**]—*Ibid.* pp. 51-58.

——. Considérations sur le traitement du lymphogranulome inguinal bénin. [**The Treatment of L.I.**]—*Ibid.* pp. 58-66. [38 refs.]

The author refers to the observations of other workers and the difficulty of infecting guineapigs and rabbits with the virus of L.I. Nicolau himself in 26 attempts obtained local lesions in 14 guineapigs and generalized lesions in 2. All inoculations of rabbits failed. Using pus from human cases of L.I. inoculated into the inguinal region in guineapigs—the local reaction consisted in a local adenopathy. In the generalized cases iliac, mesenteric, periaortic and peritracheal glands were also affected or lung, liver, spleen, kidney, showed lesions *without* lymphatic propagation.

In animals which survived 10-18 days, daily blood examinations revealed a white cell count up to 24,000, due in the earlier days to a polynuclear leucocytosis and later to a lymphocytosis and monocytosis with atypical reticulo-endothelial cells. Temperature often reached 40°C. At necropsy the glands showed the now well recognized changes. The liver was swollen and hyperaemic in patches and showed perivascular proliferative changes of reticulo-endothelium, lymph and plasma cells and typical infiltrations. In the kidney and spleen similar changes were noted, also karyorrhexis and pyknosis of the nuclei of the Malpighian follicles. There was intense hyperaemia of the lungs with subpleural haemorrhages, the pleura was adherent and covered with thick fibrino-purulent exudate. Intraperitoneal and intrapleural

inoculation were also followed by local and generalized infections with typical lesions. The inoculum, after filtration through a Chamberland L., was active on intraperitoneal inoculation.

Gland or other organ emulsion may be used for passing on from animal to animal. Six such passages in guineapigs were made but the impression was gained that the virulence diminished.

Emulsions of glands were used to inoculate dogs in the inguinal regions. A local adenopathy accompanied by fever and leucocytosis reaching a maximum in 3 to 4 days was obtained in 80 per cent. of trials. Five passages in dogs were made. The pathological changes in the glands were similar to those in man and an antigen prepared from a dog's gland gave positive skin test in human cases of L.I. In the last section of the paper the author runs through the multifarious methods of treatment which have been suggested and tried by various workers.

H. S. S.

MEYER (Kurt) & ANDERS (H. E.). Versuche zur Züchtung des Lymphogranuloma inguinale-Virus. [**Cultivation of L.I. Virus.**]—*Klin. Woch.* 1932. Feb. 20. Vol. 11. No. 8. pp. 318-321. With 1 text fig.

The authors believe they have cultivated the virus of L.I. using the method of H.B. and M. C. MAITLAND (*Lancet*, 1928, II, 596). The culture injected into the inguinal region of guineapigs produced changes in the lymphatic glands comparable with those produced by the injection of material from patients; it also caused a positive Frei reaction in human cases of the disease.

H. S. S.

KOCH (Franz). Das Lymphogranuloma inguinale. [**Lymphogranuloma inguinale.**]—*Zent. f. Bakt.* I. Abt. Ref. 1932. Feb. 11. Vol. 104. No. 23/24. pp. 529-544. [2 pages of refs.]

A very valuable summary of all the research work which has been carried out by investigators during recent years on Lymphogranuloma inguinale with bibliography—impossible to summarize but necessary to everyone interested in this subject.

H. S. S.

FISCHER (A. W.) & SCHMIDT-LA BAUME. Rektalstrikturen und Lymphogranuloma inguinale. [**L. I. and Rectal Stricture.**]—*Deut. Med. Woch.* 1932. Apr. 1. Vol. 58. No. 14. pp. 527-529. With 3 text figs. [19 refs.]

After a brief review upon strictures of the rectum of unknown etiology and the recognition by FREI and KOPPEL of the group in which they believe L.I. infection is the specific cause, the authors give the histories of four cases in women coming under their own notice and of one man whose history is worth quoting here :—

34 years old with a previous history of gonorrhoea and syphilis. 5 weeks previous to admission irregular intercourse had taken place. On examination there was a left inguinal adenitis the size of a plum but the skin was not involved. Fever 39°C. A small lesion was present on the fraenum yielding Ducrey's bacillus but no spirochaetes were found. For 10 years patient had suffered a recurring purpura and it was then present associated with thrombopenia. The spleen and liver were enlarged. Frei reaction negative. Later the gland mass became larger and softening took place. 100 cc. sterile pus withdrawn. Symptoms of partial intestinal obstruction came on and this on sigmoidoscopic examination was found to be due to a

mass of glands in abdomen pressing on the wall of the rectum 15 cm. from anal orifice. The mucous membrane was intact but injected. A typhoidal condition was present. Later a positive Frei reaction appeared and in the perineal region lesions consisting of ulcers the size of a penny (Esthiomene) developed which did not contain spirochaetes and healed under treatment with antimony.

H. S. S.

FEILCHENFELD (Hans). Zur Ätiologie der Elephantiasis vulvae ano-rectalis mit den Rectumstrikturen unter besonderer Berücksichtigung der Lymphogranulomatosis inguinalis. [**Etiology of Elephantiasis Vulvae and Rectal Stricture. Role of L.I.**—*Med. Klin.* 1932. July 8. Vol. 28. No. 28 (1439). pp. 965-966. [21 refs.]]

After a short review of some of the observations by previous writers upon the various theories which have been held in regard to the several conditions known as elephantiasis vulvae, anorectal syphiloma, etc., and rectal stricture the author mentions FREI's finding of positive L.I. skin reactions in such cases, since when an L.I. etiology has been generally accepted.

He gives the histories of one woman and two men with rectal strictures and positive Frei skin tests and then discusses the question whether the stricture is the result of specific L.I. local ulceration in the rectum or is the indirect result of inflammatory changes in the wall of the rectum due to spread from adjoining lymphatic structures. The author thinks there may be direct infection, in contradistinction to BARTHEL'S and BIBERSTEIN who believe rather in the indirect causation.

H. S. S.

LAEDERICH (L.), LEVADITI (C.), MAMOU (H.) & BEAUCHESNE (H.). Rétrécissement inflammatoire du rectum, forme aberrante de la maladie de Nicolas-Favre. Inoculation au singe positive. [**Inflammatory Rectal Stricture, Aberrant Form of L.I.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. July 4. 48th Year. 3rd Ser. No. 23. pp. 1072-1078. With 2 figs.]

The authors record a case of inflammatory rectal stricture in a woman, with no other local or general manifestations, which they have proved to be of L.I. origin, both by the skin reaction of FREI and by the method adopted by RAVAUT, LEVADITI, LAMBLING and CACHERA in a case of ulcerative ano-proctitis—namely by the subcutaneous inoculation into a guineapig of a portion of rectal mucous membrane, excision of the gland which developed in the guineapig, emulsification, and intracerebral injection into a monkey, producing thereby in the monkey the typical meningo-encephalitis.

H. S. S.

LÖHE (H.) & ROSENFELD (H.). Zur Therapie des Lymphogranuloma inguinale. [**Treatment of L.I.**—*Med. Klin.* 1932. June 24. Vol. 28. No. 26 (1437). pp. 895-897.]

Of all the treatments tried in a large series of cases the authors find that the best results are obtained by intra-gluteal injections of solganal in oily suspension, 0.2, 0.3 up to 0.6 cc. of the suspension (2 per cent. for small doses, 20 per cent. for bigger doses) every 5th day at first, then twice weekly, a series of 20 injections with a total of $1\frac{1}{2}$ grams of the gold salt being given. In the pre-softening stage the adenitis clears up and abscess formation is prevented. In later cases with

fistulation the cavities quickly dry up, the effect being noticeable even after 3 or 4 injections. For simple cases a few weeks suffice for treatment; for others a few months may be necessary. Solganal causes a transient albuminuria but is safe in the doses mentioned above, the only contra-indications being kidney disease or dermatitis. It is also unwise to give this preparation if heavy metal antisyphilitic remedies are being administered. In such cases a vaccine treatment is preferred combined with local application of X-rays as has been detailed by others. All other treatments are considered to be of little value. Locally hot applications promote absorption and if softening occurs aspiration of the abscess cavities is advocated, repeated as required.

H. S. S.

GAY-PRIETO (J.). Zur Behandlung der Lymphogranulomatosis inguinalis mit spezifischem Antigen. [**Treatment of L.I. with Specific Antigen.**]*—Dermat. Woch.* 1932. July 16. Vol. 95. No. 29. pp. 1056–1063. With 4 figs.

The author writes of the excellent results he has obtained in the treatment of 3 cases of L.I. by means of intravenous injections of pus antigen diluted 1 : 4 with saline and sterilized by heating at 60°C. for 1 hour on each of three successive days. The antigen or vaccine may be used filtered or unfiltered, the former giving better results but stronger general reactions. For this reason he advises a filtered vaccine for first injection and unfiltered vaccine for subsequent treatments as the reaction is progressively less marked as desensitization takes place. This desensitization is only temporary, for if treatment is discontinued for some time the next injection causes marked general reaction. Dose is from 0.2 cc. at intervals of 2–4 days according to reaction; 4–9 injections were administered. All three cases did well: one early non-suppurative bubo, one suppurative bubo which was aspirated at the same time, and one chronic case which had been incised twice. Healing took place in two weeks.

The same treatment was adopted in two cases of rectal affection due to L.I. virus as proved by Frei's test. In one early case, with infiltration of rectal wall rather than organized stricture, considerable improvement occurred; pain and bloody discharges ceased but the case remains under observation. The second case had had bilateral inguinal buboes five years before and was of long standing with chronic oedema of vulva, condyloma-like perianal growths and fistula. The stricture was doubtless fibrous—a few injections of vaccine caused some focal disturbances and no improvement. The case was handed over to a surgeon.

H. S. S.

FREI (W.). Zur Praxis der Lymphogranuloma-inguinale-Reaktion. [**Frei's Reaction in L. I.**]*—Klin. Woch.* 1932. Mar. 19. Vol. 11. No. 12. pp. 512–514.

An article emphasizing the necessity for care in preparing the antigen and carrying out the test which bears the author's name. Antigen should only be prepared from L.I. patients who are non-tuberculous, not suffering from any venereal disease or history thereof in the past and negative to reactions for syphilis, soft sore and gonorrhoea. The case should be a typical one, the gland to be punctured having undergone softening but the skin should be unaffected.

Contents are aspirated with syringe and large bore needle without drawing blood if possible and introduced into a sterile tube and mixed with 5-6 parts of physiological saline. $\frac{1}{4}$ -1 cc. of the mixture is then put up in Jena hard glass ampoules and sealed. These are subjected to 60°C. for two hours and to same temperature for one hour the following day on a water bath. Fresh and heated material is tested for sterility by aerobic and anaerobic culture at room and incubator temperature. It is also examined to prove absence of dead bacteria. Preserve at a low temperature protected from the light. It should give no reaction when tested on normal controls and cases of *ulcus molle*. If kept over any length of time tests should be repeated every 3 months and after 9 months it should be discarded. Once an ampoule is opened the remains should be thrown away.

For the test 0.1 cc. is injected intracutaneously after alcohol disinfection into suspects and also controls. The result should be read after two days, not before. In a positive result there appears an infiltrated raised inflammatory area $\frac{1}{2}$ cm. in diameter at least, often larger, surrounded by a reddened zone; in the centre of the area, which is dome-shaped rather than flat, a small centre of necrosis is usually found.

A positive reaction may not occur in a L.I. case until the process has involved the skin. In fully developed cases the reaction may fail—the phenomenon of “anergy”—sometimes seen in premenstrual period and in early syphilis but a negative should lead to a further test with another batch of antigen. Skin allergy usually lasts for life, it is believed; but it may be lost after a number of years, a fact which should be remembered in testing some cases of “elephantiasis genitoanorectal.”

Excessive reactions may be given by unclean antigen or one containing bacterial products and false reactions may be afforded by injection of other antigens, since the skin of the L.I. patient is hypersensitive to non-specific substances derived from the skin of other subjects. A clear-cut full reaction at the proper time interval must be required. The reaction is then absolutely specific. H. S. S.

VALERIO (Americo). A proposito da lymphogranulomatose inguinal.—*Folha Med.* 1932. Mar. 15. Vol. 13. No. 8. pp. 90-91.

WILLOUGHBY (Hugh). Climatic Bubo and Ulcerating Granuloma.—*Jl. Roy. Nav. Med. Serv.* 1932. July. Vol. 18. No. 3. pp. 202-208. With 2 figs.

REVIEWS AND NOTICES.

FISCHL (Viktor) & SCHLOSSBERGER (Hans). **Handbuch der Chemotherapie. Erster Teil: Metallfreie organische Verbindungen.** [Handbook of Chemotherapy. Part I. Non-Metallic Organic Compounds.]—pp. viii+357. 1932. Leipzig: Fischers medizinische Buchhandlung. [Subscription price M.29; after publication price M.34]

In this country, at any rate, the comparatively young science of Chemotherapy has not yet reached the stage when it may be said to suffer from a surfeit of text-books, while even in Germany, the fatherland of Chemotherapy, complete treatises are still comparatively few in number. This is probably due to the fact that to produce a satisfactory text-book of Chemotherapy it is necessary to possess a knowledge of chemistry, pharmacology and experimental pathology with which few, if any, individuals are equipped. In the present instance this difficulty has been largely overcome, for a chemist and an experimental pathologist have combined to write a handbook of Chemotherapy in three volumes, of which the present volume deals with the organic metal-free compounds. Works on Chemotherapy must necessarily be written from either the chemical or the medical point of view, for while the chemist is primarily anxious to know what compounds have shown therapeutic activity, with a view to preparing even more potent derivatives, the medical man desires to obtain information as to the substances which have been found efficacious in a given infection. Though the present work is written more especially from the chemical standpoint the pharmacological properties and clinical applications of each compound are at the same time adequately dealt with. The metal-free organic compounds which have been found to possess chemotherapeutic action form a somewhat heterogeneous collection. As a result, successive chapters deal with such diverse substances as acyclic chlorine compounds, unsaturated fatty acids, simple benzene and naphthalene derivatives, aminoacids, quinoline and quinine derivatives, emetine and allied substances, glucosides, acridine compounds and other dye stuffs. It is perhaps a somewhat depressing reflection to consider how few of these multifarious compounds are of any real value in the treatment of parasitic infections. This must not be taken to imply, however, that the book does not contain a mass of highly valuable information. The correct formula for plasmoquine is now given with more precision: it is shown to be 8-(*ω*-diethylamino-*isopentyl*) amino-6-methoxyquinoline and not as was previously thought the N-diethyl-amino-*isopentyl* 8 amino compound. Atebrin, the new anti-malarial drug so recently prepared by the I. G. Farbenindustrie of Elberfeld, is described as the dichlorhydrate of an alkylamino-alkylaminoacridine derivative. Its action on malarial schizonts is fully discussed. Much interesting historical matter is also incorporated in the volume. The matrimonial affairs, for instance, of Don Luis Geronimo Fernandez de Cabrera, Bobadilla y Mendoza, 4th Count of Chinchon and sometime viceroy of Peru, are exhaustively dealt with. Countess Anna, who for so long has figured in the history of quinine, despite the fact that she never crossed the sea to South America, must now retire in favour of her successor, the second wife of the Count, Francisca Henriquez de Ribera, whose existence has but recently come to light.

Each chapter of the book is followed by a very complete bibliography; the text is well printed and is singularly free from printer's errors. There is, however, no index. If the high standard of this first volume is maintained the work will most certainly take its place as an authoritative text-book of Chemotherapy.

G. M. Findlay.

W. C. for HAUSHEER, W. C., to mention the most confusing.] Actual tests for disability from light infections were evidently not attempted. Ascaris and trichuris were dealt with. Clayton Lane.

MATTLET (G.). Note sur le parasitisme intestinal au Ruanda-Urundi. [**Intestinal Parasites in Ruanda-Urundi**].—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 51–57.

Faecal examinations were presumably by smear; 1,519 were made and the percentages of findings were: ascaris 53, trichuris 23·8, ankylostomes 19·1, the amoeba of dysentery 16·9, *Taenia saginata* 10·8, *Trichomonas intestinalis* 6·3, strongyloides 5·8, enterobius 4·8, *Schistosoma mansoni* 2·7. No post mortem examination has been made without finding *T. saginata*, as many as 8 having been noted in one body. Echinococcus is absent. Disinfestation may come too late to save life. C. L.

COLOMBO. Les parasitoses intestinales parmi les enfants des écoles indigènes du district du Tanganyika-Moero. [**Intestinal Parasites of Native Scholars of the T. M. District.**].—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 35–50. With 10 figs.

Of 1,505 children examined by faecal smear, 51·4 per cent. were infected, the figures in different schools varying between 25·4 and 80·2. Of the children 37·6 per cent. appeared to harbour one kind of parasite, 13·8 per cent. more than one. The percentage of those, seemingly carrying one kind of parasite only, who harboured nematodes was 78·4, namely ankylostomes 57·3, ascaris 9·7, strongyloides 7·2, trichuris 3·3, threadworms 0·9; of those harbouring schistosomes it was 17·3, rhizopods 3·8, and tapeworms 0·5. Those in whom more than one parasite was incriminated are detailed in 18 categories. C. L.

SANDGROUND (G. J. H.). [**Report on Intestinal Helminths of 54 Natives in Livingstone Hospital.**].—*Northern Rhodesia Med. Rep. on Health & Sanitary Conditions for Year 1930.* p. 95.

During a week's stay Sandground made 54 faecal examinations by the Willis-Mallory method. Though some of the patients had already undergone treatment, there were disclosed 32 cases of hookworm, 19 of strongyloides, and 5 of trichostrongylus infection, and it was believed that the average case, as examined, harboured less than 50 hookworms. The prevalent worm was necator, the worm load was held to be of no serious consequence to the host, and treatment was deemed unnecessary. If carbon tetrachloride is given, the dose advised is 3 to 4 cc. [45 to 60 minim] and not 3 doses of 3 cc. on alternate days as hitherto given locally; [as BLACKIE reports (*ante* p. 314) 3 cc. has killed a Nyasaland African]. In the body of the publication is the sentence "This report [of Sandground] confirms the opinion held by up-country Medical Officers. It will be seen that it contains advice of very considerable importance, and that Professor Sandground advises a policy of laissez-faire." It is, however, remarkable that there is in fact a note to Sandground's report which runs "The medical officer in charge of Livingstone Native Hospital takes a less favourable view of the effects of hookworm on natives admitted to this hospital and considers it produces a definite disability and lowers resistance to other

diseases especially chest complaints." [There is then on a medical matter the opinion on one side of a layman with a week's local experience and on the other of a resident medical man presumably with much, and the administration seems to prefer the former.] C. L.

KELLER (A. E.), LEATHERS (W. S.) & BISHOP (E. L.). **A State-Wide Study of the Human Intestinal Helminths in Tennessee.**—*Jl. Preventive Med.* 1932. May. Vol. 6. No. 3. pp. 161-184. With 4 text figs.

By the Stoll-Hausheer method, which examines 0.005 gm. of faeces, the eggs in 31,999 faecal specimens were counted between July 1929, and March 1931. The maximum, average and minimum percentage number of positives for various counties were: for hookworm 34.9, 6.8, 0, for ascaris 63.9, 27.1, 0, for trichuris 24.3, 7.6, 0, for *Hymenolepis nana* 7.7, 2.9, 0. Hookworm infections were greatest between 10 and 14 years of age, the others between 5 and 9. These figures are compared with surveys made between 1910 and 1914 [the unexpressed assumption being that the diagnostic methods employed during the two periods are equally accurate]. In the earlier period the average percentage incidence of hookworm was 25.4, of ascaris 21.3, of trichuris 4.7 and of *H. nana* 2.4. It is concluded that hookworm incidence has greatly fallen, but that the other 3 parasites are still present in the same areas to the same extent. The remedy advised is suitably constructed privies and their use by all, and an education which emphasizes "the importance of hand-to-mouth transmission of ascaris, trichuris and *Hymenolepis nana* and the necessity of good personal hygiene." C. L.

YOKOGAWA (S.) & WAKEJIMA (T.). **On Fecal Examination for Parasites of School Children of Formosan-Chinese Parentage, especially Medical and Biological Observations on *Ascaris lumbricoides*.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1932. June. Vol. 31. No. 6 (327). [In Japanese. With 4 figs. on 1 plate. English summary pp. 60-63.]

The paper is based on treatment given to 1,820 children. In the Taihoku region the percentage of infected persons is equally high in town and country but the former harbour fewer worms; there is no difference in age, sex, blood group, or social class. Disinfestation might produce a marked improvement in nutrition, and many worms meant low school grade. When only unfertilized ascaris eggs were present it was safe to conclude that males were absent, but with both kinds of eggs present there might not be excess of females over males. Unfertilized eggs were more frequent in heavy than in light infections. Unfertilized eggs were present in 37-40 per cent. of all cases and were the only ones present in 20 per cent. Unisexual simple parasitism by the female occurred in 6.36, by the male in 3.34 per cent. of cases. Santonin was found to be twice as efficient an anthelmintic as decoction of *Digenea simplex* [the doses are unstated in the English summary] and removed all worms in 44 per cent. of cases. The bigger the worm, whether this was or was not the effect of sex, the easier was its expulsion. Ascaris, trichuris and enterobius were the commonest helminths, hookworms were most frequent in farm districts, paragonimus and *Hymenolepis diminuta* were rare. C. L.

PLATONOW (N. W.) & FROLOWA (W. T.). [Incidence of Helminthic Infections among the Personnel of Public Dining Rooms in Novosibirsk.]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 1. pp. 28-31. [In Russian.]

The authors have examined 230 of the personnel of the public dining rooms in the town Novosibirsk for the presence of helminths. The method was to take from each person 2 slides of the perianal scrapings, 2 faecal smears and 4 slides of the film from a faecal suspension (after FÜLLEBORN). The parasites were found in the following percentages: Nematodes 32·6, *Enterobius vermicularis* 30·0, *Trichuris trichiura* 2·6, *Ascaris* 0, *Trichostrongylus* sp. 0. Cestodes 10·4 (*Taenia* 7·4, *Hymenolepis nana* 2·17, *Diphyllobothrium latum* 0·87). *Opisthorchis felineus* 0·44. The incidence of helminths according to occupation was as follows: charwomen 76 per cent., kitchen attendants 68, cooks 43, and dish-washers 41·26.

C. A. Hoare.

PEREPÉREZ (Francisco) & PALAU. Contribución al estudio de las helmintiasis endémicas de la vega baja del Segura. San Fulgencio (Alicante). [Helminthiasis in San Fulgencio (Alicante).]—*Rev. Sanidad e Hig. Pública*. 1932. May. Vol. 7. No. 5. pp. 377-392. With 10 figs.

The number of persons examined in this investigation was not large, less than a thousand in town and rural irrigated areas together. In the former 582 were examined, 259 children and 313 adults, and 72 children (27·8 per cent.) and 37 adults (11·4) were positive. In the latter of 344 examined 69 were positive, 46 of 160 children and 23 of 184 adults; altogether 178 positive out of 926. Of the different infestations the commonest was *H. nana* in 87 (9·3 per cent.) 75 children and 12 adults; *Oxyuris* in 38 (4·1) next; and then in order *Strongyloides* 27 (2·9), *Trichuris* 17 (1·8), *Ankylostomes* 8 (0·8) and *Ascaris* in 1 adult. The hookworm incidence was small and the results almost insignificant; the authors do not consider that any campaign against it is justified.

H. H. S.

CHANDLER (Asa C.). Susceptibility and Resistance to Helminthic Infections.—*Jl. Parasitology*. 1932. Mar. Vol. 18. No. 3. pp. 135-152. With 1 chart in text. [41 refs.]

" . . . In helminthic infections the development of resistance to the effects of infection constitutes a problem quite distinct from development of resistance to continued reinfection. Resistance to injurious effects of infection is influenced by species and race of host, diet, age, intercurrent disease, and other factors which lower the reserve vitality of the host. Resistance to acquisition and continued accumulation of worms is influenced by species of host, age, diet, vitamin deficiency, and existing or pre-existing infection with the same species of worm. The development of acquired resistance is shown not only by failure of the hosts to acquire more parasites, but also by loss of parasites already established, by partial inhibition of reproduction, by retardation in rate of growth and decrease in size of worms, and in some cases by complete inhibition of development. Evidence is afforded that the immunity is at least in part local in nature, that blood changes play little if any part, and that the acquired resistance is highly specific in its nature."

C. L.

YOSATO (M.) & SUMI (I.). **Helminth Eggs on Vegetables in Mukden.**—*Jl. Oriental Med.* 1932. Apr. Vol. 16. No. 4. [In Japanese. English summary p. 51.]

Examinations of vegetables bought in public market and streets showed that helminth eggs (in the main ascaris with trichuris next) were found in vegetables in the following percentages, lettuce 92, spinach 54, radish 43, onion 33, cabbage 17, potato 8, and cucumber, tomato and egg plant 0. Presumably the ground was fertilized with human faeces. C. L.

WITENBERG (G.). **Fish as a Source of Worm Diseases in Man.**—*Harefuah.* Jerusalem. 1932. May-June. Vol. 6. No. 3. pp. 127-139. With 5 figs. [In Hebrew. English summary p. 4.]

After dealing with the biology of helminths transmissible by fish the summary suggests that the author's own contribution to knowledge is the following :

" A three minutes exposure to a temperature of 60° kills the metacercariae [of Heterophyes]. Thymol and fern extract proved to have anthelmintic properties against *Heterophyes*. *Dibothriocephalus latus* which is seldom found in Palestine, is brought into the country by immigrants and has apparently no suitable conditions for development here." C. L.

LAMSON (Paul D.) & WARD (Charlotte B.). **The Chemotherapy of Helminth Infestations.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 173-199. With 4 text figs. [89 refs.]

Having classed intestinal parasites according to their degree of attachment or penetration into the intestinal wall, their distribution in the intestine and their life history, the authors point out that *in vitro* tests valid for the human patient must be carried out either on human parasites or on closely allied ones, and that even then they will fail in "substances such as santonin which are active in the body." There follows a valuable classified list of about 300 chemicals which have been used as anthelmintics together with a reference for each "in order to orient one as to how it was used." More detailed consideration is given to thymol, betanaphthol, oil of chenopodium and ascaridole, carbon tetrachloride and tetrachlorethylene. "Carbon tetrachloride has probably been given in more cases of hookworm than any other drug, the treatments numbering several million. . . . There have been extremely few deaths in relation to the number of treatments. . . . Besides the avoidable danger of death from an overdose [of thymol or oil of chenopodium], cases with unexplained idiosyncrasy to these substances are common, death having occurred after the administration of minute amounts. . . . Carbon tetrachloride differs from thymol and chenopodium in that we understand the cause of intoxication. We can prevent it by proper dietary measures and can counteract the early stages of intoxication by proper calcium therapy. . . . Dizziness, faintness, etc., similar to that seen after taking any volatile anaesthetic substance frequently occurs after its administration, but this should be clearly differentiated from intoxication." Yet, "those having treated large groups with thymol or chenopodium will all agree that many unpleasant symptoms occur, varying from dizziness, and faintness, to collapse and death". [Not all. ASHFORD after two million treatments

with thymol and the reviewer after only some 60,000 have been unable to record fatality with 4 gm. doses.] For ascaris the authors divide anthelmintics into those producing fatal or temporary narcosis or paralysis of worms, those acting on the cuticle, those dissolving the parasite, and those acting in unknown ways. Hexylresorcinol acts on the cuticle of ascaris and is advocated as being non-toxic to man even after absorption and as having been given to thousands of patients for its action when excreted by the kidneys, and as being without known contraindications. There is, however, marked loss of anthelmintic power unless there is scrupulous abstention from food.

"We not only have some million or more chemical substances which may be considered possible therapeutic agents, to choose from, but these substances have been classified by the chemist and allow us to select closely related substances with beautiful gradations of properties. It remains for the pharmacologist to study the tissues of the body and attempt a pharmacological classification which will allow a better use of this enormous amount of material."

C. L.

FÜLLEBORN. Immunität und Allergie bei Helminthenkrankheiten. [**Immunity and Allergy in Helminth Diseases.**]—Reprinted from *Ier Congrès Internat. de Microbiologie, Paris, 1930.* 10 pp. [3 pages of refs.]

In this close written summary of his own work and that of others Fülleborn goes into the question of protection in man and animal against intestinal and other worms, and of the cutaneous reactions provoked by the injection of worm antigens and their practical worth.

C. L.

BOUCHER (H.). Une infection multiple par les helminthes. [**Multiple Worm Infestation.**]—*Marseille-Méd.* 1932. Apr. 25. Vol. 69. No. 12. pp. 544-547.

The infections were with loa, hookworm, trichostrongyle and *Schistosoma mansoni*, in a traveller to South America and to Africa, whose habits were not those of sobriety personified.

C. L.

GIRGES (Rameses). **Treatment of Schistosomiasis haematobium.**—*Jl. Trop. Med. & Hyg.* 1932. May 16. Vol. 35. No. 10. pp. 145-154. [10 refs.]

The paper deals with the clinical management of those cases in which something more is needed than exhibition of the sheet anchor, antimony. In cystitis for example Girges has had no benefit from bladder irrigation except in cases where it mechanically removes decomposed urine and débris. Renal colic may merely imply schistosomal ureteral swelling and needs immediate antimony treatment. The advantages of and contraindications for perineal cystotomy for bladder drainage are very fully discussed. Finally there is detailed consideration of the treatment of calculus, periurethral abscess, fistula, stricture, incontinence and acute retention of urine, malignant disease, cutaneous schistosomiasis, perineal tumours, hydronephrosis and gynaecological conditions.

C. L.

MORRISON. Le traitement chirurgical des schistosomes (de la bilharzia haematobia). [**Surgical Treatment of Schistosomiasis.**—*Rev. Prat. Malad. des Pays Chauds.* 1932. Jan. 11th Year. Vol. 12. No. 1. pp. 21–30.]

The number of operations performed for schistosomiasis by Morrison from 1918–1920 was 1,314, namely perineal cystotomy 371, for urinary fistula 170, for removal of sessile or pedunculated rectal tumours 54, and simple laparotomies in cases of *S. mansoni* 971, the last having a surprisingly good effect. C. L.

SULLIVAN (S. J.). *Schistosoma haematobium*: a Sporadic Case in Illinois.—*Jl. Amer. Med. Assoc.* 1932. May 7. Vol. 98. No. 19. pp. 1642–1643.

A child of 4 who had never been more than 100 miles from Chicago developed a pertussis-like cough and strangury. "Examination [of the urine] showed macroscopic and microscopic blood, some yeast spores and a terminal spined yellowish egg. . . . Another specimen revealed 3 adult worms and many eggs."

"After considerable investigation to determine the source of the infection, an aquarium was found in which some tropical fish were kept, and among these were found snails that closely resembled descriptions of the intermediary host of the snail *Bullinus*. Examination of the water from the fish bowl showed fully developed cercariae, the stage of the parasite which infects man. This gives definite proof of the origin of the infection."

[In spite of all the assumptions made in this paper the case will no doubt burden the literature as a clear indigenous American one.]

C. L.

KHALIL (Mohamed) & HASSAN (Ali). A Preliminary Note on a New Skin Reaction in Human Schistosomiasis.—*Jl. Egyptian Med. Assoc.* 1932. Apr. Vol. 15. No. 4. pp. 129–130.

It is not the skin reaction but the antigen which is described as new, for the authors have used the adults of *S. bovis* as an antigen for the detection of schistosomiasis by skin reaction. Details are to be published later, the information now given being that 42 persons known to be uninfected gave negative reactions, 10 cases "cured" a few months to 14 years earlier gave positive immediate ones, while of 136 cases passing ova all but 4 gave immediate, and only 2 gave delayed reactions. In 12, the immediate wheal was less than 10 mm. [not the usual 2.4 cm.] in diameter, and the 4 negative cases were undergoing treatment with foudin. Extract of molluscan liver had proved unsatisfactory as an antigen "owing to the presence of the snail tissue itself which does not play any part in the production of immunity reactions." [Hamilton FAIRLEY, this *Bulletin*, Vol. 28, p. 196 and TALIAFERRO, HOFFMAN and COOK, Vol. 26, pp. 534, 535 reported that they had surmounted this difficulty in different ways.] C. L.

ARCHIBALD (R. G.) & MARSHALL (A.). A Descriptive Study of the Cercaria of *S. haematobium* in the Sudan.—*Jl. Trop. Med. & Hyg.* 1932. Aug. 1. Vol. 35. No. 15. pp. 225–228. With 1 coloured plate. [11 refs.]

The care taken to ensure the identity of the cercariae, a point not always sufficiently observed, was great. Clean laboratory-bred

Bullinus truncatus (which included *B. contortus*, *B. dybowskii*, and *B. innesi*) were infected from miracidia proceeding from Sudanese cases of urinary bilharziasis. The cercariae escaping from these molluscs are minutely described and their identity was further clinched by successful infection of two *C. sebaeus*. Quite definitely the authors satisfied themselves independently that this cercaria has only 3 pairs of penetration or secretory glands. Young *B. truncatus* were more readily infected than old, development to the cercaria stage needed at least 6 to 7 weeks, cercariae continued to be shed by snails for 75 days and *Physopsis africana*, *P. globosa*, *P. didieri*, *P. eximia*, *Planorbis alexandrinus*, *Cleopatra bulimoides*, *Melania tuberculata* and *Lanistes boltenianum* could not be infected. C. L.

GIRGES (Rameses). **The Aetiology of "Egyptian Splenomegaly."**—*Jl. Trop. Med. & Hyg.* 1932. Mar. 15 & Apr. 1. Vol. 35. Nos. 6 & 7. pp. 86-90; 99-105. With 1 graph. [37 refs.]

The conclusions reached in this closely reasoned paper, which concerns itself with a mass of literature as well as the author's own observations, are indicated in the opening paragraph.

"Egyptian splenomegaly is a disabling endemic parasitic syndrome caused by male *Schistosoma mansoni* infestation of the liver and portal vein. It is widespread amongst the rural population in all parts of Lower Egypt, particularly in localities situated by the end-canal and at the termination of big irrigation canals, where schistosomiasis mansoni is rife. It affects 2 per cent. of my patients. It may be compared in its different stages with Katayama disease, which is the visceral type of schistosomiasis japonicum and closely resembles Banti's disease. It presents an absolutely different picture from the ordinary type of schistosomiasis mansoni. There is very little or no alimentary disturbance or implication of the gut, the brunt of the infection being inflicted upon the viscera. Thus, besides the febrile symptoms, anaemia and other blood changes, there is at first a definite hepatic enlargement and an increasing hypertrophy of the spleen and abdominal lymphatic glands, and later on there occur hepatic cirrhosis, marked splenomegaly and ascites." C. L.

TAYLOR (A. W.). **An Inquiry into the Origin of an Outbreak of Schistosomiasis among Europeans at Kagoro, Northern Nigeria.**—*West African Med. Jl.* 1932. Apr. Vol. 5. No. 4. pp. 61-62.

Four, perhaps 5, cases of infection with *S. mansoni* occurred among Europeans who had bathed in an attractive rocky pool, entirely without vegetation, situated at the bottom of a 15 foot waterfall. It was found however, that above the falls were several small ponds connected by trickles of water with the bathing pool below and containing *Planorbis pfeifferi* and *P. stanleki*, which were not separately identified at first, and that of 280 dissected in November and December of two years the numbers infected with fork-tailed cercariae were 8. Of 82 dissected in April and June none were infected. A village lay 50 yards from the pools and the path to the river bank passed between them. The cercariae were morphologically indistinguishable from those of *S. mansoni*, but experimental infections could not be applied. C. L.

JONES (S. B.). **Intestinal Bilharziasis in St. Kitts, B.W.I.**—*Jl. Trop. Med. & Hyg.* 1932. May 2. Vol. 35. No. 9. pp. 129-136. With 14 text figs. (1 map).

St. Kitts is one of the Leeward Islands and it was in a man from this group that Sir Patrick MANSON first found lateral spined ova. It is

conservatively estimated that a quarter of the population is infected with *S. mansoni* and held that the human infection could be completely eradicated in 3 months leaving that in the wild African green monkey, discovered by CAMERON, to be dealt with. Clinically, the disease is classed as febrile and urticarial, gastro-intestinal, and hepato-splenic. Tartar emetic has been the drug used in nearly all the 200 cases treated during the last 7 years, they being indigenously acquired with few exceptions. After looking vainly for infected snails for 13 years JONES, in November 1931, found some planorbids emitting bifid cercariae in a tank fed by a stream in an endemic area. Microscopic faecal examination, presumably by smear, of 45 boys showed the following percentages of infection: Total 97·7, ascaris 91·1, trichuris 20, strongyloides 2·2, *S. mansoni* 22·2. C. L.

VOGEL (Hans.) Hauterscheinungen bei Schistosomiasis. Beobachtungen ueber Zerkarien-Dermatitis, Kutanreaktionen und ein Vulva-Granulom. [**Skin Phenomena in Schistosomiasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. July. Vol. 36. No. 7. pp. 384-399. With 10 text figs. [19 refs.]

Having considered recent literature, Vogel describes the papule which formed 6-8 hours after the entrance of *S. mansoni* into the skin of a white person. In two negroes who washed in water containing these cercariae there was merely pruritus. Excision of skin into which cercariae had bored $2\frac{1}{2}$ hours earlier showed their tracks, and the cercariae in the lower layers of the epidermis with a surrounding neutrophil and eosinophil reaction. Among 50 Africans the dried powdered mid-intestinal gland of *Planorbis pfeifferi* infected with *S. mansoni* rubbed into vaccination scratches produced a dark rash in 22 cases of schistosomiasis, 18 being definitely positive and 4 doubtfully so; while among 28 who showed no eggs, there was no reaction in 14, a doubtful one in 8 and a positive one in 6, but 3 of these last showed red and white corpuscles in the urine, and in all 6 one examination only was made. The histology of a bilharzial granuloma of the vulva is described. It contained paired schistosomes and many eggs, and these eggs were able to escape through the epidermis. C. L.

GOTO (Takeo). Beiträge zur Kenntnis der Migrations-route von *Schistosoma japonicum* in den Endwirten. [**The Migration Route of *S. japonicum* in the Final Host.**]—*Fukuoka-Ikwadaigaku-Zasshi (Fukuoka Acta Med.)*. 1932. Mar. Vol. 25. No. 3. [In Japanese. German summary pp. 11-13.]

Goto has set himself to discover whether MIYAGAWA and TAKEMOTO FAUST and MELENEY, and IJIMA are right in concluding that after reaching the lungs cercariae arrive at the liver through the circulation, or whether NARABAYASHI and SUYEFASU should be followed in the conclusion that the route between the two viscera is directly through mediastinum, pleura and diaphragm. He finds that the washing out of the organs and tissues of dogs indicates the former route, while serial sections of the bodies of decalcified mice indicates the latter. He concludes that you can get what result you like by the choice of the method you use; but he takes no account of the established influence of an abnormal host in leading larval worms astray. C. L.

ABBATUCCI (S.). La prophylaxie de la bilharziose. [Prevention of Schistosomiasis].—*Ann. d'Hyg. Pub. Indust. et Sociale.* 1932. May. Vol. 10. No. 5. pp. 267-272.

The life history of the parasites is described, as is prevention by treatment and by protection of water. The tendency of the infection, it is believed, is to become world wide. C. L.

MACHATTIE (C.) & CHADWICK (C. R.). *Schistosoma bovis* and *S. mattheei* in Irak with Notes on the Development of Eggs of the *S. haematobium* Pattern.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 147-156. With 2 plates. [16 refs.]

" 1.—*Schistosoma bovis* is described from Irak.

" 2.—Horses, donkeys and mules have been found to be definitive hosts for *S. bovis*.

" 3.—The eggs of *S. bovis* in Irak are never or only very rarely passed in the urine and the pelvic and urinary structures are not pathologically involved in the infection which is essentially portal and intestinal.

" 4.—A survey of the literature shows that the generally accepted characters of naturally occurring *S. bovis* have been based on scanty material or on specimens collected from one locality only. It has been the writers' good fortune to have at their disposal a vast number of specimens collected from several natural hosts in various widely separated outbreaks, and they conclude that the existing standard of *S. bovis* as described by KHALIL (1924) should be modified as follows:—

" (a) Length 12 mm. to 28 mm.

" (b) The measurements of the egg *in utero* 90 to 205 μ by 38 to 62 μ . The measurements of the egg in the gut wall 130 to 260 μ by 40 to 95 μ .

" (c) Only rare specimens show the vitellaria confined to the posterior fourth of the female. In the vast majority of females the vitellaria occupy a little less than half the total length of the body.

" (d) The shape of the egg is usually that described by KHALIL but approximately 0.1 per cent. of females show somewhat oval shaped eggs.

" (e) About 1 per cent. of females show many typically shaped *S. bovis* eggs *in utero* and in the same uterus one or more typically shaped *S. haematobium* eggs having the same measurements as the egg of this parasite of the human subject.

" (f) Approximately 0.2 per cent. of females contain solely eggs of *S. haematobium* shape and measurement. Such females are only distinguishable from this parasite of man in that the vitellaria occupy approximately one-half of the total length of the female.

" 5.—*S. mattheei* as described by VEGLIA and LE ROUX (1929) is indistinguishable from *S. bovis* as the latter occurs in Irak.

" 6.—Even in an area of intensive urinary schistosomiasis of man, the occurrence in cattle and sheep of eggs indistinguishable from those of *S. haematobium* does not justify the incrimination of these domestic animals as reservoirs of human infection." C. L.

KOURI (Pedro) & ARENAS (Rogelio). La distomatosis hepatica en Cuba. [Liver Fluke Infestation in Cuba].—1932. May. Vol. 1. 176 pp. With 30 figs. Habana.

This is a collection of three papers published in *Vida Nueva* of October and November, 1931 and March, 1932. The first two were dedicated to the memory of Drs. LEBREDO and AGRAMONTE. The first describes in full detail two cases of human infestation by *Fasciola hepatica* and in the introduction mention is made of 5 others, all 7 being

met with between July, 1931, and the following March. In addition 3 cases of clonorchiasis in Chinese were encountered. The illustrations in this article are good, both of the *Fasciola* itself and of the morbid conditions to which it gives rise, but no new matters are brought forward.

The second and third articles refer especially to treatment and the latter to the good effects obtained in the authors' patients by means of emetine hydrochloride. In fact, they regard this drug, injected in doses of 3 cgm. daily for 17-18 days, as a specific, the course of treatment being controlled by use of the duodenal sound. The third paper is reproduced also in French. H. H. S.

KOURI (Pedro) & ARENAS (Rogelio). **Actual Conditions of the Hepatical Dystomatosis [sic] in Cuba. Its Treatment. Previous Statements about its Prophylaxis.**—*Vida Nueva*. 1932. May 15. Vol. 29. No. 5. pp. 464-468. [Spanish version pp. 458-463 and French pp. 469-474.]

Within a year 8 cases of infection with *Fasciola hepatica* and 4 of *Clonorchis sinensis* have been discovered in Cuba. For the former infection emetine is held entirely specific, non-surgical drainage of the biliary tract disclosing degenerate eggs while later none are found. The dosage of emetine in cattle is being investigated. C. L.

SIEVERS (H. K.) & OYARZUN (R.). Diagnostic de la distomatose hépatique par la réaction allergique. [**Diagnosis of Hepatic Distomiasis by an Allergic Reaction.**]—*C. R. Soc. Biol.* 1932. June 27. Vol. 110. No. 22. pp. 630-632.

Using as antigen washed, dried, and powdered *Fasciola hepatica* [it was apparently immaterial whether the flukes were or were not first soaked in alcohol or in ether for 24 hours] there was a positive reaction to the scratch test in 61 sheep which after death showed these flukes and none in 39 which did not. The intradermal reaction in 35 sheep was equally definite. The reactions were of the immediate type. C. L.

TUBANGUI (Marcos A.). **Observations on the Life Histories of *Euparyphium murinum* Tubangi, 1931, and *Echinostoma revolutum* (Froelich, 1802), (Trematoda).**—*Philippine Jl. Sci.* 1932. Apr. Vol. 47. No. 4. pp. 497-513. With 3 plates. [12 refs.]

"Snails (*Lymnaea peregra* Müller) obtained from an irrigation canal in Trinidad Valley, near Baguio, Mountain Province, Luzon, were found infested with two kinds of echinostome larvae (trematodes) distinguishable from each other only by the number of spines on the head collars of the cercariae and metacercariae.

"Encysted metacercariae possessing thirty-seven cephalic spines, when fed to experimental animals, developed into adult worms in young house pigeons after twelve to fifteen days; they failed to infect rats and a monkey. The adult parasites have been identified as *Echinostoma revolutum* (Froelich, 1802).

"Encysted metacercariae with forty-five cephalic spines, when fed to experimental animals, developed into full-grown adults in white laboratory rats after ten to fifteen days; they failed to develop in young pigeons and in a monkey. The adult worms have been identified as *Euparyphium murinum* Tubangi, 1931."

[*E. revolutum* has been reported as a parasite of man in Formosa (this *Bulletin*, Vol. 27, p. 453).] C. L.

KATSUTA (I.). **Studies on Trematodes whose Second Intermediate Hosts are Fishes from the Brackish Waters of Formosa (4th Report). On a New Trematode "*Monorchotrema yokogawai*" of which the Mullet is the Second Intermediate Host.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Mar. Vol. 31. No. 3 (324). [In Japanese. With 8 figs. on 1 plate. English summary pp. 25-26.]

Monorchotrema yokogawai n. sp., with cat and dog as optimum hosts, has been experimentally transferred to man. Its description is given with illustrations. The eggs closely resemble those of *Metagonimus yokogawai* and other Heterophyidae, and measure 0.0317 by 0.0156 mm.

C. L.

ASSATOUROW (A. G.). [Four Cases of Liver Dicrocoeliasis in Man.]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 1. pp. 38-39. [In Russian.]

During 1928-29 the author observed eighteen human cases of *Dicrocoelium lanceatum* infection in the Caucasus. In fourteen, the ova were recovered from the faeces only; while in four the diagnosis was confirmed by finding the ova in the duodenal aspirates.

C. A. Hoare.

WITENBERG (G.). **On the Anatomy and Systematic Position of the Causative Agent of So-called Salmon Poisoning.**—*Jl. Parasitology*. 1932. June. Vol. 18. No. 4. pp. 258-263. With 1 fig. [15 refs.]

In Witenberg's view *Nanophyetus schikhobalowi* Skrjabin and Podjapolskaja, 1931 obtained from the aborigines of East Siberia is synonymous with *N. salmincola* Chapin, 1926.

C. L.

BACIGALUPO (Juan). Algunas consideraciones sobre teniasis por *Hymenolepis nana*. [Infestation by *Hymenolepis nana*.]—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* 1932. Feb.-Mar. Vol. 7. No. 3. pp. 359-364.

The author quotes previous records to show that infestation by *H. nana* is fairly common in children in the Argentine and by no means rare in adults. Thus, LYNCH (1904) found the ova in 8.2 per cent. of 137 faeces of children, PARODI and WIDACOVICH in 8 per cent. of 150, the author himself found them in 10 out of 142 in 1924, and 6 of 72 in 1927, i.e., 7.4 and 8.3 per cent. respectively. As regards adults CASTEX and GREENWAY found 5 positive of 614 (1925), and 0.7 per cent. of 2,023 (in 1926), and the author 6 out of 448 adults (1.3 per cent.) at the Military Hospital.

He gives more detailed accounts of three adults at the Military Hospital. They suffered from colic, nausea, nervousness and a constant feeling of fatigue, and in one case from epileptiform convulsions which had lasted for 5 years and disappeared after 4 gm. of ethereal extract of male fern and a saline purge. This treatment produced

7,360, 2,000 and "about 1,000" worms in the 3 cases respectively. The property of *H. nana* to undergo evolution by direct and indirect cycles the author designates diheteromonoxenia. *H. H. S.*

TSUCHIYA (H.) & ROHLFING (E. H.). *Hymenolepis nana*: **Report of Additional Cases and an Experimental Transmission from Man to Rats.**—*Amer. Jl. Dis. Children.* 1932. Apr. Vol. 43. No. 4. pp. 865-872. [23 refs.]

Three cases of *H. nana* infection were discovered during routine faecal examinations of 362 children in St. Louis for protozoal infections. In two, who could be examined further, no evidence of damage by the infection was discovered. Onchospheres were obtained from human faeces by alternate washing and sedimenting and fed to 6 rats who had been carefully examined and protected against infection. Two of them began passing onchospheres about 6 weeks later, and 6 and 10 strobiles were recovered on killing them. The others showed no sign of infection during 68 days of observation. The results of SAEKI in 1920 and UCHIMURA in 1922 in producing infection from rat to man are mentioned. *C. L.*

KELLAWAY (Charles H.) & FAIRLEY (Keith D.). **The Clinical Significance of Laboratory Tests in the Diagnosis of Hydatid Disease.**—*Med. Jl. Australia.* 1932. Mar. 5. 19th Year. Vol. 1. No. 10. pp. 340-342. With 3 text figs.

With the intelligent application of 4 laboratory tests the correct diagnosis of hydatid infection will, it is held, be made in at least 90 per cent. of cases. The first test is the presence of laminated membrane, often described by the patient in sputum or urine as grape skins, of scolices or of hooklets, all illustrated; diagnostic puncture is discouraged for fear of anaphylaxis, secondary echinococcosis, or, in lung infection, rupture into bronchi. Eosinophilia to 300 per cmm. is found before operation in about half the cases. The intradermal reaction with pooled, sterile, active hydatid fluid is immediately positive in at least 95 per cent. of infections before a first operation; it is of no diagnostic value later; it is held positive when the wheal, with out-runners, measures at least 2.4 cm. in one diameter, or 2.2 cm. in two diameters; a delayed reaction to a first test is found before operation in half the infections. The complement fixation test is positive in from 50 to 60 per cent. of infections tested before any operation; and almost invariably so if a cyst has ruptured or suppurated within the previous month, though if within 2 months the positive reaction may have gone. *C. L.*

MORENAS (L.). Utilisation du liquide de cysticerque (*Cysticercus tenuicollis*) comme antigène dans la réaction de Casoni. [**Use of Cysticercus Fluid as Antigen in Casoni's Reaction.**]—*C. R. Soc. Biol.* 1932. June 3. Vol. 110. No. 19. pp. 321-322.

In two cases, in which there had been operation for hydatid cysts, intradermal reactions, presumably delayed, were obtained with fluid obtained from *C. tenuicollis* of sheep as positively as with hydatid fluid; and locally the former is far more readily obtained than the latter. *C. L.*

MILLER (Harry M.), Jr. & GARDINER (Margaret L.). **Protection of the Rat against Infection with a Larval Tapeworm by Serum from Immune Rats.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Mar. Vol. 29. No. 6. pp. 779-780.

Three groups each consisting of 12 rats were given by stomach tube equal quantities of a uniform suspension of onchospheres. One group (C) was a control. Two hours after the infective feed the other two groups were injected intraperitoneally with 1 cc. of serum for every 25 gm. of body weight. In group B. this serum was from artificially immunized rats, in group A from infected rats. The results were as follows :—

Group.				Living onchospheres 2-6 mm. in diameter.	Small dead onchospheres.
A	...	...	...	0	0
B	...	...	...	0.5	6.0
C	...	...	...	22.2	18.7

In another experiment analogous results were obtained. "Complete protection has now been secured by the injection of serum from rats infected with cysticerci." C. L.

- i. MILLER (Harry M.), Jr. **Transmission to Offspring of Immunity against Infection with a Metazoan (Cestode) Parasite.**—*Proc. Soc. Experim. Biol. & Med.* 1932. June. Vol. 29. No. 9. p. 1124.
- ii. —. **Acquired Immunity against a Metazoan Parasite by Use of Non-Specific Worm Materials.**—*Ibid.* pp. 1125-1126.

i. A degree of protection, lasting about 6 weeks, was transmitted to the offspring of female rats which had been actively immunized against *Taenia taeniaeformis* or infected with its larval stage.

ii. Introduction into the peritoneal cavity of rats of whole, or long pieces of, living *Taenia pisiformis* resulted in a high degree of protection against infection by the larvae of *T. taeniaeformis*. C. L.

WARDLE (Robert A.). **On the Technique of Cestode Study.**—*Parasitology.* 1932. June. Vol. 24. No. 2. pp. 241-252. With 2 figs. [13 refs.]

For collection of cestodes from mammals the advice given is to ligature at the pylorus and ilio-caecal valve and, by snipping the mesentery, to straighten the small intestine on a black board on which a 12 inch scale is marked. Lengths of 12 inches are opened, obvious helminths removed to decimolar (decinormal) NaCl, the section detached, and its contents squeezed with a camel's hair mop into the same solution. The process is repeated foot by foot. If flooding with the saline does not detach cestodes the bit of intestine to which they are attached should be cut out and removed with them. Cestodes are at once taken from the saline to a glass plate. The scolex is held by a brush soaked in hot water at 60°C. and with another brush the strobile is stroked downwards with the same hot solution and then transferred to a 10 per cent. solution of saline-formalin. [The legend to Fig. 1 describes the

process, however, as "painting with hot 10 per cent. formalin." Staining and methods of reconstruction by wax, celluloid or gelatine are described.
C. L.

WITENBERG (G.). **On the Cestode Subfamily Dipylidiinae Stiles.**—*Ztschr. f. Parasitenk.* 1932. May 18. Vol. 4. No. 3. pp. 542–584. With 45 text figs. [2 pages of refs.]

"A new definition of the subfamily *Dipylidiinae* is given. It comprises the genera: *Dipylidium*, *Joyeuxia* and *Diplopylidium*, while other genera which until recently were included in this subfamily are separated to form a new subfamily *Monopylidiinae*. A redescription of seven well established species out of 34 known is given, on the basis of type material and specimens collected in Palestine.

"... Remarks on individual variations and life history ... are given and the synonymy is elucidated."
C. L.

JOYEUX (Ch.), HOUDEMER (E.) & BAER (J. G.). **Etiologie de la sparganose oculaire. [Etiology of Ocular Sparganosis.]**—*Marseille-Méd.* 1932. Mar. 25. Vol. 69. No. 9. pp. 405–409.

The paper considers the mechanism of production of this infection, the identity of *S. mansoni* and of the worm causing ocular infection and notes that the report is preliminary.
C. L.

LANCET. 1932. May 28. pp. 1167–1169. [15 refs.]—**Antigen-based Tests in the Diagnosis of Nematode Infections.**

Although all the papers considered in this article have been abstracted in this *Bulletin*, their collection into a critical note should be valuable. After dealing with the possibility of obtaining a pure antigen in cases where the worm lies imbedded in tissue three antigen-based tests are considered. Precipitin reactions while present constantly in trichinosed animals only develop after an interval so considerable that by that time human cases are dead or convalescent: while intestinal infections show no parallelism between a positive reaction and the presence of the parasite. In considering intradermal reactions there occurs the sentence "These findings suggest that antigen-based tests" immediate or delayed "for nematodes will mainly prove effective in those infections in which the parasite lives in plasma or lymph." Complement fixation tests, apart from those applied with negative results by FAIRLEY and Glen LISTON in 1924 to *Dracunculus* infections, do not seem to have been applied to lymph-dwelling nematodes until FAIRLEY did so to *Loa* and *W. bancrofti* infections (this *Bulletin*, Vol. 28, p. 679) and it is believed that in face of these antigen-based tests and of the "anatomical studies which are being made by O'Connor the prospects of further and early additions to knowledge of filariasis seem more promising than has for long been the case."
C. L.

OTTO (G. F.). **Ascaris and Trichuris in Southern United States.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 200–208. [16 refs.]

Certain figures concerning ascaris infection are brought together in the table reproduced overleaf.

TABLE I.—Comparison of *Ascaris* and *Trichuris* Infestations in Tampa, Florida, and Louisiana (Rural) with that in Panama and in the Mountains of Southeastern United States. Males and Females, 0–14 Years Old.

	Total number examined	Ascaris		Trichuris	
		Per cent. positive.	Average egg count per gram feces	Per cent. positive	Average egg count per gram feces
1. Panama*	1,119	57.9	27,970	60.0	1,640
2. Virginia (Mts.)†	1,573	56.1	13,730	29.1	435
3. East Tennessee (Mts.)	13,191	36.7	5,960	11.8	149
4. Tampa, Florida—					
(a) Latin Americans	105	41.9	10,900	40.0	980
(b) Native Americans	98	26.5	5,770	18.4	270
(c) Negroes	145	39.3	8,800	17.9	220
5. Louisiana	2,474	24.9	8,210	39.7	1,410

* Compiled from tables given by Cort, Stoll, Riley and Sweet, 1929.

† Compiled from tables given by Cort, Otto, and Spindler, 1930.

It is repeatedly noted that ascaris infection can frequently be correlated with pollution in the yards of houses. For instance in Tampa, although "native-Americans" have sewered houses with modern bathrooms, these seem to be little used while the small house yards are polluted. Again in Louisiana the presence of privies does not mean absence of pollution in the yard, and it is stated that ascaris infection is nearly equal to that found in the mountains and trichuris infection is much greater. Suggested causes of this excess of trichuris infection are, a greater susceptibility of ascaris eggs to violet rays, and a shorter life for ascaris, so that from originally mixed infections only trichuris survives. The rapid reinfection which follows ascaris disinfestation in heavily infected parts is held to make reliance on treatment useless as a means of lowering general infection. "However, the sanitary privy or in fact most any type of privy no matter how obnoxious if used by all members of the family will effectively control infestations with these parasites." [No doubt the evidence for this statement will be made public.] The slow progress which must be expected in educating people to the use of sanitary measures and appliances is stressed; it is not expected to be effective for generations.

C. L.

NOLF (L. O.). **Experimental Studies on Certain Factors Influencing the Development and Viability of the Ova of the Human *Trichuris* as compared with those of the Human *Ascaris*.**—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 288–322. With 8 figs. [27 refs.]

"Studies were made on factors affecting the development of the ova of human trichuris and ascaris which showed certain adaptations for survival

and development as well as some of their limitations. The respiratory gases produced in the development of the trichuris ova were measured by the Van Slyke method of gas analysis which showed that the R.Q. of ova, developed from the single cell to embryonation, was 0.86, and that there was no exchange of nitrogen during this period of development. The calculated quantity of oxygen used by a trichuris ovum in becoming embryonated, 0.000002719 cc., is not materially different from that used by an ascaris ovum.

"The experiments in which the ova were exposed to high temperatures showed that trichuris ova were killed at slightly lower temperatures than were the ascaris ova, heating to 52° to 54°C. for a short time being lethal. Exposure of the ova and partly developed embryos to freezing temperatures (-9 to -12°C.) resulted in a high percentage of fatality in the trichuris but had no apparent effect on the ascaris.

"The percentage of development in chambers of various relative humidities confirmed the finding by Spindler that trichuris ova required a more highly saturated atmosphere before they could develop than did ascaris ova and that the former were less resistant to desiccation.

"Ova were exposed to ultra-violet light from two sources, one having a wavelength from 280 to 315 mμ and the other from 180 to 315 mμ. Light from either source was highly fatal to the ascaris ova, there being no difference in effects that correlated with the difference in quality when given the same Clark units exposure. The trichuris ova were much more resistant to the effects of the light."

C. L.

FÜLLEBORN (Friedrich). *Klinisches und Biologisches ueber Ascaris lumbricoides*. [*A. lumbricoides*, **Clinical and Biological**.]—Reprinted from *Internat. Ärztlicher Fortbildungskursus*. 1931. Vol. 13. 38 pp. With 4 text figs. [5 pages of refs.]

X-rays in LAURELL's hands showed that the normal site of the ascaris is in the jejunum and that in infections with hundreds they lie stretched motionless side by side with room between for the chyme to pass, but if numbers pass downwards they may knot themselves into obstructing masses. Their wandering and their perforation of the gut are described, and their feeding, their toxins and the anaphylactic changes they may produce considered, a matter which leads on to the clinical symptoms, which may, however, be absent. The concentrative method illustrated under diagnosis is that of looping the surface, introduced by KOFOED and BARBER, and the convex preparation is examined under a low power without a cover. Eosinophilia and skin reactions are dealt with. For treatment oil of chenopodium is advised as more active than santonin, harmless for children and usable in smaller dose than it is against hookworms. Epidemiology and prevention are dealt with, and attention drawn to the post-war increase of this infection in Germany, the result of insanitary trenches. Lastly the wandering of the intracorporeal larval stages is dealt with from its discovery by STEWART onwards.

C. L.

OTTO (G. F.). **The Appearance and Significance of the Unfertilized Eggs of *Ascaris lumbricoides* (Linn).**—*Jl. Parasitology*. 1932. June. Vol. 18. No. 4. pp. 269-273. With 1 plate.

Since Otto holds that laboratory technicians even now do not usually recognize unfertile ascaris eggs, first described by MIURA and NISHIUCHI in 1902, and since the triangular type seems never to have been figured, he describes and figures the various types which may be found, as viewed in decinormal caustic soda; pointing out the ease

with which this solution dissolves the outer albuminous coat and thus alters the egg's appearance. Unfertilized eggs occurred to the extent of 15.9 per cent. of 51,329. Of faecal slides containing ascaris eggs, unfertile eggs were found in 68 per cent. and fertile eggs in 74 per cent., that is to say, unfertile eggs alone were found in 26 per cent. of slides. Single females may produce either or both forms. C. L.

MUIR (J. B. G.). **Removal of an Ascaris from the Common Bile Duct.**—*Brit. Med. J.* 1932. June 11. pp. 1077-1078. With 1 plate. [10 refs.]

This report from Tientsin, N. China, concerns a coolie of 35 suffering with most acute epigastric pain, rigidity and distension, vomiting, slight icterus, pulse 100, temperature 97°, leucocytes 21,000, polymorphs 85 per cent. Operation disclosed an ascaris, evidently a female, in duodenum, common bile duct, cystic duct and gall bladder. Muir's personal experience includes two ascaris-containing appendices and one posterior no-loop gastroenterostomy, and fistulae from abdominal gunshot wounds extruding ascarids. Stress is laid on the need in ascaris-infected countries to remove ascarids before operation. C. L.

PURCELL (Frederick M.). **Acute Colitis due to *Ascaris lumbricoides* simulating Dysentery.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. p. 199.

In a child of 18 months the stool was dysenteric, the microscope showed mucus and blood cells with no amoebic cysts or macrophages but with some ascaris eggs. One drachm [4 gm.] of castor oil and one minim of oil of chenopodium, repeated once brought away a knot of 12 worms and all symptoms ceased. Ascaris infects nearly everyone at Keta, Gold Coast. C. L.

KURISU (Sotaro). **An Experimental Investigation on the Effect of Vitamin Deficiency upon the Infection and Development of *Ascaris lumbricoides*.**—*Sei-I-Kwai Med. J.* 1931. Oct. Vol. 50. No. 10 (548). [In Japanese. English summary pp. 7-8.]

Experiments on rats and pigs led to the conclusion that a diet deficient in vitamin A predisposes to infection with ascaris. C. L.

ISHII (Y.) & YAMASHIRO (R.). **Experimental Studies on the Appearance of Ascaris-Larvae in the Urine.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Mar. Vol. 31. No. 3 (324). [In Japanese. English summary p. 27.]

It is intensity of infection which determines the appearance or otherwise of ascaris larvae in the urine of rabbits. If 200,000 to 300,000 larvae are given some almost always can be found in this; if fewer than 100,000 they rarely appear. C. L.

STILES (Ch. Wardell). **Hookworm Disease in White School Children: Comparison of Two Methods of Survey.**—*Jl. Amer. Med. Assoc.* 1932. June 18. Vol. 98. No. 25. pp. 2189-2190.

"It is rather generally acknowledged that a microscopic examination should precede treatment in all cases of hookworm disease. This view is based on sound experience and sound theory. The microscopic examination is especially important if carbon tetrachloride is to be used in treatment, for if the case is complicated with Ascaris infection, the clinician should know this fact before treatment is instituted."

As regards symptomatic diagnosis Stiles's position is that any person with real experience of the clinical aspect of this infection is thoroughly justified after a brief inspection of white children—a "street car diagnosis"—in arriving at conclusions as to whether hookworm disease is playing any material role among the children. He has had his own conclusions checked by microscopic examination [the technique is unstated] with the results shown in the table.

TABLE 1.—Comparative Results obtained by Two Methods.

Symptomatic Survey Method.					
School number		Number of children seen	Hookworm suspects*		
			Number	Per cent. uncorrected	Per cent. corrected. ‡
11	...	474	228	48	38
12	...	345	132	38	30
13	...	478	366	77	62
14	...	73	70	96	77
15a	...	79	78	99	79
15b	...	—	—	—	—
Total 5 schools ...		1,449	874	60	40

Microscopic method

School number					Number of children examined	Hookworm positives†	
						Number	Per cent.
11	...	...	...	...	—	—	—
12	...	...	...	...	—	—	—
13	...	...	...	...	—	—	—
14	...	...	...	...	37	36	97
15a	...	...	...	...	87§	78	90
15b	...	...	...	...	42	28	67
Total 3 schools ...					166	142	86

* Includes all gradations from very severe cases, such as dirt eaters, to doubtful suspects.

† Includes all hookworm infections from severe infestations to exceedingly light infections, such as carriers.

‡ Deduction of 20 per cent. for average theoretical error.

§ Seven of these were of preschool age and were not seen in the original clinical survey.

Moreover, among 199 children from schools in 2 States the number of positive hookworm infections recognized by the microscope was 158, of ascaris 53, of enterobius 11. Of the children 84 per cent. were infected with one or more species of worms. He concludes:—

"For all practical purposes, in judging whether this infection is of educational and administrative importance to the school, the conclusion

reached is as sound and valuable (perhaps more so) as (than) the conclusion based on the microscopic observations, for the latter considers only the worms, while the former considers the effect of the worms on the children."

C. L.

STILES (Ch. Wardell). **Some Practical Considerations in Regard to Control of Hookworm Disease in the United States under Present Conditions.**—*Jl. Parasitology*. 1932. Mar. Vol. 18. No. 3. pp. 169-172.

Stiles continues his self-imposed campaign to convince Americans that when Mr. Rockefeller, having started hookworm work in the United States, ceased to do so it was not because he considered the hookworm problem solved but because he held it to be the duty of local authorities to see the work through. Stiles repeats the reasons for using the schools as re-energizing points for the new campaign [ante, p. 418]. He goes on:—

"Will the teachers do the work? My answer is: Yes, up to at least 90 per cent. efficiency. I speak from years of practical field experience with these enthusiastic, dependable, loyal public servants.

"The foregoing plan will reduce suffering, increase efficiency and educational results, and make the school funds go further. But of itself it will not eradicate hookworm disease. The final problem is to change the daily habits of hundreds of thousands of whites, Indians, and negroes (who are living under a system of 'dog sanitation') to the Mosaic system of 'cat sanitation.' This will take at least three generations longer of educational health work. Civilisation was not made in a day."

C. L.

ARNAUD (R.). Rapport de mission sur l'ankylostomiase dans le secteur du laboratoire de Leopoldville. [**Ankylostomiasis in the Leopoldville Laboratory Sector.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 5-34. With 10 figs.

An uncritical abstract of this paper would be valueless to those in ordinary tropical practice. Stool examinations were made by a modification of one of Stoll's techniques but this was after a time further modified by the substitution for a decinormal caustic solution of one containing either 1.4 NaCl and 2.25 sodium hypobromite per cent. or 1 gm. KBr in a 30 per cent. solution of the hypo. This is stated, pontifically, that is without evidence offered, to give a more even suspension and to break up the stool, and so release eggs more satisfactorily than the methods of either Stoll or the Caldwells; so that it is of interest to note that the estimates given in the paper for the number of eggs passed daily by a female hookworm were from 2,630 to 2,900 and that it is stated "Ce nombre est légèrement inférieur à celui de Stoll." In point of fact it is a third to a quarter of Stoll's figure for formed stools. The discovery that there exists some relationship between egg counts and worm numbers is attributed to LOOSS, and with the present general tendency to believe that this is a yet more modern development it is well to say in criticism that while LOOSS was indeed led, in 1897, by his knowledge of this general relationship to his discovery of the cutaneous route of infection by hookworms, he was in fact deliberately using knowledge acquired by LUTZ and by LEICHENSTERN in 1885, and apparently by PARONA still earlier.

By the diagnostic methods just indicated ankylostome infection was detected in 71.7 per cent. of 2,653 stools and it should be noted that

the reader must not be guided by Schema No. 1 in which, for example, the column representing 0.04 is longer than that representing 0.11. Of 251 worms recovered 92.8 per cent. were necators and 7.2 per cent. ancylostomes. Occult blood in faeces was tested for by pyramidon, acetic acid and hydrogen peroxide in rectified spirit. It was never found when eggs were fewer than 800 [per gm.], was nearly always present when they were over 3,000, and might or might not be detected when numbers were intermediate, and it is concluded that nearly all the infected are healthy carriers. The alternative, of course, is that just as present liver function tests do not reveal the extent of liver damage caused by carbon tetrachloride [this *Bulletin*, Vol. 24, p. 235], so these tests of faeces do not reveal the extent of bleeding which has occurred high in the intestine and WELLS's direct observation that a single *A. caninum* wastes blood at the rate of 0.84 cc. daily [*ante*, p. 421] suggests that for hookworms in man this explanation probably holds. In 6 districts tested, haemoglobin lay between 61 and 67 and the average amount was greater in those who possessed hookworms than in those who did not. This is due to the fact that infants under a year old and not hookworm infected showed a haemoglobin content of 35 to 45 and Arnaud points out that malaria is very prevalent and an anaemia producing factor here.

An antigen was obtained by drying and powdering 1,000 hookworms. The powder weighed 0.9237 [gm.]. It was dissolved in ten times the original worm weight of an alcohol-acetone solution, whose proportions are unstated, and again diluted 15 to 20 times before use. Complement fixation occurred in 14 per cent. of negatives, 78 per cent. of those with up to 1,000 eggs [per gm.] and from 1,000 upwards averaged about 90 per cent. Intradermal reactions were hopelessly irregular. The diagnostic technique did not, of course, enable the absence of infection to be determined and since Arnaud holds that D.C.F. is certainly the most exact of these it seems surprising that it was not used where exact results are essential.

C. L.

YENIKOMSHIAN (H. A.) & BERBERIAN (D. A.). **A Preliminary Report on the Incidence of Hookworm Disease in Syria and the Lebanon.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 399–406. With 1 map in text.

Essentially this paper deals with 1,700 faecal examinations made by a modified Kofoid and Barber technique on inhabitants of the Syrian coastal strip in which the mean annual temperature is "10.7°F." [70.7°F.] with hot, dry weather from May to October and temperate and wet weather from November to April, yet with a high atmospheric humidity at all times. The mean percentage of hookworm infection was 21.2 but in the vicinity of Sidon and Beirut 70 and 35 respectively, the worm being identified as *A. duodenale*. Striking features which are disclosed in the paper are (1) the amount of clinical ankylostomiasis which has appeared of recent years, for which two contributing causes are suggested, the influx of allied forces and Egyptian Labour Corps in 1918, and the substitution for mulberry cultivation of close set, bushy banana trees on land systematically irrigated and manured with night soil, (2) the "lightness" of the infection compared with the ill effects produced of which the following is a typical example :—

"A young girl (Case 13,952), from Djeldib near Beirut, had only 1,600 eggs per gram of formed stools, and after treatment passed only eight adult

hookworms in the three days subsequent to treatment; her red blood cell count on admission was 2,400,000 per c.mm.; her differential count showed 9 per cent. eosinophils; and her haemoglobin was 47 per cent. by Sahli's method of determination. Six weeks after treatment, stool examination showed no ova; she was strong and healthy, her red count had risen to 4,500,000 per c.mm.; her white count was 6,200 per c.mm. with 1 per cent. eosinophils, and her haemoglobin was 92 per cent."

An urgent plea is made for further investigation and effective control and it seems fair to suggest in comment that, seeing how serious the results of light infections have proved to be, a more delicate diagnostic technique is advisable in future. C. L.

DAENGSVANG (Svasti). **An Epidemiological Study of Hookworm Disease in a Rural Coastal Plain and a City Area of Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. Mar. Vol. 7. No. 3. pp. 359–375. With 1 folding chart. [15 refs.]

There are compared by Stoll's egg-counting technique, using apparently 0.02 gm. of faeces, specimens from 2 rural areas, A and B, the most obvious difference between the two being, apparently, that in A every house but one has a pit latrine 2 to 5 feet deep, while in B more than half have none. In A, infection was disclosed in 75 per cent. with an average egg count of 4,710 per gram and a range between 50 and 417,000. [Comparison of context and table shows that the stated average of 7,000 for 67 females is incorrect: the correct figure is 7,000 for 88 males and 1,700 for 67 females.] In B, infection was disclosed in 88 per cent., with an average egg count of 7,060 and a range between 100 and 81,400. In area C, a town area, figures are not directly comparable since when the weight of infection was too slight to be disclosed by Stoll's method, Willis's or even the smear was used. Only 27 per cent. of examinations were positive, with an average of 620 eggs per gram. Here sanitation is strictly enforced and house yards are of hard-packed soil. Soil pollution was investigated in the rural areas, and experimental studies were carried out on untrapped cultures. C. L.

TINIO (Joaquin R.). **Bradycardia in Ankylostomiasis. Observation in the Clinics, San Juan de Dios Hospital with Report of a Case followed for Five Months and Remarks on its Treatment.**—*Bull. San Juan de Dios Hosp. of Manila.* 1932. Apr. Vol. 6. No. 4. pp. 125–133.

In the author's experience bradycardia, not tachycardia, is the rule in hookworm disease, at least when the patient is lying down. A case is described in which repeated treatments with carbon tetrachloride failed to rid the faeces of ova [was there trichostrongylus infection?] while "squash seeds" were successful. The procedure was magnesium sulphate, 30 gm. and two hours later 80 gm. of pumpkin seeds in a syrup with orange flower water. C. L.

GARIN (Ch.), ROUSSET (J.) & GONTHIER (B.). **Organisation de la lutte contre l'ankylostomose dans une exploitation minière: deuxième étape: le traitement et la prophylaxie. [Organization of Measures against Hookworm in a Mine. Treatment and Prevention.]**—*Méd. du Travail.* Lyon. 1932. Mar. Vol. 4. No. 2. pp. 23–33.

In the first part of this paper which dealt with the industrial side of the infection and was summarized in *Bulletin of Hygiene*, Vol. 6,

p. 539, it was explained that diagnosis was by a modified Telemann's technique which was used also for grading infections according as 1 drop of the sediment spread under a 22 mm. square cover had in it 10, 11 to 100, or over 100 eggs. No persons in the first group, which is by far the largest, have been found to be the worse for their infection, but it is significant of the accuracy of this diagnostic technique that a person in this group will sometimes be positive and sometimes negative. The routine has been to treat those in the second and third groups as a matter of rule, but those in the first only if they come to hospital for some injury, for treatment was carried out in hospital only. Meat, alcohol, beans, lentils and carrots are forbidden; legumes, soft food and milk are allowed. Thymol and tetrachlorethylene were given, the former particulated with carbonate of magnesia in capsules containing one gram, but whether more than one capsule was given is unstated. Tetrachlorethylene was also given in 1 gm. capsules, 3 on the first day, 4 on the second and 5 on the third, followed by sulphate of soda 40 gm, on the third day, a few persons complaining of drunkenness after it. With the latter drug 77.5 per cent. were disinfested after a single treatment, which is a better result than they obtained with thymol or that which, they state, others have obtained with other anthelmintics. [Though not quite analogous, the percentage of the total worm recovery by CAIUS and MHASKAR given by 4 gm. of particulated thymol in one portion, 1 cc. of ascaridole and 1 and 3 cc. of carbon tetrachloride were 99.4, 83.4, 90.8 and 95.7.] In prophylaxis any provision of privies in or disinfestation of the mine is held quite impracticable. The provision of privies on the surface, the treatment of carriers, and the prevention of reintroduction of infection by examination at the time of recruitment are the means on which reliance is placed, and heavily infected persons being presumably the greatest danger to the mine, treatment should begin with them. C. L.

THIRY (G.) & DOMBRAY (P.). *Ancylostoma duodenale* et *Strongyloides stercoralis* dans les mines de fer de la Lorraine. [*A. duodenale* and *S. stercoralis* in the Iron Mines of Lorraine.]—*C. R. Soc. Biol.* 1932. July 29. Vol. 110. No. 27. pp. 1159–1161.

By direct examination, which presumably means by smear, or by coproculture in doubtful cases, 878 miners were investigated, with the discovery of 9 hookworm and 9 strongyloides infections. The mines have a temperature of 16° to 18°C. and are dry, except for the approaches where defaecation does not take place; the men work shod and clothed; the reaction of their stools is acid owing to their food, and the ore rough and likely to damage larval sheaths. Such are the characters suggested as in action in keeping down the infection rate. It is noted, however, that culturing is successful when the ore is used with faeces. All the strongyloides infections were in foreigners, and it is believed that they are gradually lost in the course of work in the mines. C. L.

HIRST (L. Fabian). **Hookworm Disease and Ceylon Sewage Works.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1932. May 20. Vol. 2. Pt. 5. pp. 245–275. With 2 folding plans. [2 pages of refs.]

A short abstract cannot do justice to the quantity and quality of the work reported here. In 1919 ground itch followed by clinical hookworm disease occurred in coolies employed in the Colombo sewage

works to dig out trenches which had been filled at least 3 years earlier. In 1922 eight coolies immersed themselves, even to the neck, in foul sludge which they were emptying from a sump in a sewage pumping station, suffered within half an hour from intense irritation, and later had a severe eruption. A week afterwards it was found that all had a slight hookworm infection. But in spite of treatment then, 14 days later [by which time larvae entering with the irritation would be in the intestine and 2 mm. long] and again in 11 days, eggs reappeared in the stools 58 to 82 days afterwards, though worm counts then proved lighter than the extent of cutaneous irritation had seemed to render likely. Hirst suggests in explanation that some of the irritation was due to larvae of animal worms, since the sump drained an animal market; [but had not his timely treatment been most effectual?]. Detailed, carefully controlled, investigations both of effluent and sludge were carried on in two-storied Imhoff septic tanks receiving human sewage only from the Angoda Asylum, there being three tanks in series. Regarding eggs in the effluent, these were counted by D.C.F.F. [D.C.F. pushed to practical finality] with special care not to exceed the limit of effective concentration as shown by the type of collection spin by spin. The results were:—

	Hookworm ova.			Ascaris ova.	Sus-pended solids
Detritus tank	21,000	11,200	15,500	39,000	483.0
No. 1 double storey tank	240	170	300	1,700	1.9
No. 2 " " "	180	90	100	200	1.2
No. 3 " " "	50	70	60	160	0.9

For hookworm ova saturated salt solution (1,200 S.G.) was used and for ascaris calcium chloride solution at 1,300 S.G. Regarding sludge, D.C.F.F. and Baermann's larval extraction method showed the following results:—

Day of rest in sludge pan.	Mean hookworm ova per gramme.	No. of hookworm larvae per 100 grammes approximately.
0	104	4,000
3	88	2,500
7	76	542
15	55	102
23	29	30
36	8	0
42	3	0
46	0	0

A de Saussure hot box (*San. Supp. Trop. Dis. Bull.* 1925, p. 130) showed that no infective larvae were detected if a sludge-faeces mixture were heated to 52°C. for 30 minutes and that in a glazed-cover lagoon this temperature was reached on the third day in March in Colombo and maintained thereafter. These lagoons were ordinarily used simply as drying pans. In one of them a quantity of faeces containing 18,000 ova mixed with sludge was placed in each of a series of small containers,

one of them being removed daily and cultured with loamy soil in vessels provided with larval traps; the 24 hour culture yielded 124 larvae and subsequent ones none. Pig latrines, in which dejecta run into a trough behind the latrine, and the family pig eats them empty, are rapidly being replaced by bored hole latrines which seem, it is held, "admirably suited to the habits of even the most primitive agriculturist," and in which larvae which attain maturity show, it is stated, no tendency to ascend towards the surface. C. L.

GRAUBNER (Friedrich). Ueberseeische Ankylostomiasis im Tropen-
genesungsheim Tübingen. [**Ankylostomiasis from Overseas in
the Tübingen Convalescent Home.**].—*Arch. f. Schiffs- u. Trop.-
Hyg.* 1932. Aug. Vol. 36. No. 8. pp. 429-439. [15 refs.]

The number of hookworm infections treated in this German convalescent home in the last 10 years is 193, from Asia, Africa and America. The infections in the main were light, as evidenced by the fact that 15 only were recognized by smear and 193 by a concentrative method, mainly the "NaCl method." There were among children 87 who harboured trichuris also, 26 who harboured ascaris, and 22 others who harboured both. As regards haemoglobin, measured by Sahli's instrument, 67 of 107 children had 75 per cent. or less before treatment, and 46 were in this category 3 to 4 weeks later; the like figures for eosinophilia of less than 10 per cent. were 53 and 93. In 98 children treated with oil of chenopodium 51 were held cured after one treatment, 23 after two, 4 after three, while 20 left the home uncured. C. L.

MAPLESTONE (P. A.). **Further Observations on Seasonal Variation in Hookworm Infection.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1145-1151. With 2 charts.

Maplestone continues his observations on seasonal variation in hookworm infection [this *Bulletin*, Vol. 28, p. 230]. In this case they comprised (1) the lines of a jute mill on the Hooghly with an efficient pan conservancy system used by most persons, (2) a crowded and insanitary village adjoining, (3) an adjacent, less crowded, less insanitary, village. About 200 stools were collected monthly from each section, examined by D.C.F., and on those found positive egg counts were done by Stoll's method. The population frequently changed, coolies working in three-months' contracts. In section 1, the lowest percentage of infection was 70.5 in April, the highest 83 in October; the lowest average egg count was 273 in March, the highest 773 in August. In section 2 the corresponding figures were, 69 in March, 85.5 in October, 252 in November and 841 in July. In section 3 they were 75 in January, 91 in September, 186 in October and 986 in July. It is pointed out that the highest egg counts per gram of faeces were in July and August and the highest monthly rainfall in July. Maplestone notes that his experience in Europeans on leave in Europe falls in with that of the PAYNES [*ante*, p. 64] and CALDWELLS [*ante*, p. 422, namely that when individuals are followed up, infection as measured by egg counts is not rapidly lost. To account for the discrepancy W. C. SWEET suggested to Maplestone, with diffidence, two possible explanations. that worms acquired in Bengal from April to June do not become established, or that hookworms are more prolific at that season in Bengal. Finally, in a Dooars tea garden on clay, D.C.F. and egg counts showed in 1930 infections far less heavy than in the neighbouring ones on sand already reported. C. L.

HILLER (W.). Zur Diagnose der Ankylostomiasis. [**Diagnosis of Ankylostomiasis.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. June. Vol. 36. No. 6. pp. 343-344.

The argument is that the duodenum, where hookworms dwell, is by their invasion rendered tender, a sign which Hiller discovered by accident, one which he holds to be always present when there is infection and always absent when there is no evidence of infection, and one which will render unnecessary reliance on clinical symptoms and on costly and tedious microscopic examination. An editorial note points out that the habitat of election of hookworms is not the duodenum.

C. L.

DOVE (Walter E.). **Further Studies on *Ancylostoma braziliense* and the Etiology of Creeping Eruption.**—*Amer. Jl. Hyg.* 1932. May. Vol. 15. No. 3. pp. 664-711. With 8 figs. [45 refs.]

After an historic survey, it is noted that of 301 cases of creeping eruption observed at Jacksonville, Florida the percentage distribution was: lower limbs 75·8, (chiefly in the feet) hands and arms 14·2, body 8·97. Experimental dogs and cats used were half-grown animals in which D.C.F. had on several occasions shown no eggs, the tests being supplemented by cultures. It was deemed necessary to undertake experiments to determine that in *A. braziliense* parthenogenesis does not occur and that it does not hybridize with *A. caninum*. Regarding effects of temperature, experiments described are held to show that thermotropism in larvae was demonstrated with dog, cat and rat skin, potato and the ear of a living kitten and that it is more active than histiotropism [at least thermoactivation was in evidence]. Creeping eruption by application of infective larvae of *A. braziliense* could not be produced on dog, cat, rat, guineapig or monkey, but the percentage of adults developing after oral infection was 26·03 in cats and 42·96 in dogs and after skin infection 14·22 and 13·57 respectively.

A boy of 9 was found harbouring *A. braziliense* only, that is to say, with larvae from this boy's stool, only this hookworm developed in kittens infected, and no hookworms developed in man, though striking creeping eruption did. On a later occasion larvae cultured from the boy's stool were made to infect two pups and a kitten and *A. caninum* was recovered from all three; these larvae were also placed on the skin of a man who later after treatment voided 18 female and 14 male *Necator americanus*. The conclusion reached is that the boy had lost his *A. braziliense* infection and acquired others with *A. caninum* and *N. americanus*. [The means employed to determine that the boy's stool was used on all occasions do not seem mentioned, nor does he seem to have been subjected to treatment to determine his real infection.]

C. L.

CRUZ (Walter Oswaldo). Hypothese sobre a pathogenia da anaemia na ankylostomose. Papel preponderante da deficiencia de ferro no organismo. [**The Pathogeny of Hookworm Anaemia.**—*Brasil-Medico.* 1932. July 2. Vol. 46. No. 27. pp. 593-597. English summary.]

The author relates two cases with closely similar symptoms. The patients suffered with ankylostomiasis and resultant anaemia; one

had 2,800,000 red corpuscles and 25 per cent. Hb., the other 2,500,000 corpuscles and 26 per cent. Hb. The former was given 4 doses of anthelmintic at 7 day intervals and 2 ascaris and 529 hookworms were expelled. The blood 31 days after the beginning of treatment was but little improved—red blood corpuscles 3,400,000, Hb. 28 per cent.—in fact the differences were almost within the limits of error. The anisocytosis, poikilocytosis, and the oligochromaemia remained unchanged. The diet during treatment was, intentionally, poor in iron.

The second patient was given raw liver 250 gm. daily and small doses of iron preparations intramuscularly, but without result. Naegeli's method of giving Ferrum redactum, 3 gm. daily, was then tried. Twenty-one days later a blood examination showed red cells 4,540,000 and Hb. 70 per cent., no anisocytosis or poikilocytosis.

The author concludes that, as the treatment of ankylostomiasis by vermifuges does not of itself modify materially the blood picture, whereas reduced iron in large doses, without vermifuges, effects rapid blood regeneration, the anaemia of hookworm is due to faulty metabolism of iron.

[It is clearly unsafe to draw so important a deduction from a single case and recent studies tend to throw doubt on the conclusion that *ordinarily* hookworm anaemia is due to faulty iron metabolism.]

H. H. S.

BACHMAN (George W.) & RODRIGUEZ-MOLINA (R.). **Skin Hypersensitiveness to Hookworm Antigen.**—*Amer. Jl. Trop. Med.* 1932. July. Vol. 12. No. 4. pp. 279–284.

These skin tests cover 2,392 individuals.

"The present experimental results demonstrate that in certain individuals there is a marked cutaneous hypersensitivity to extracts of *Necator americanus*. In a large percentage of cases this hypersensitivity can be detected by using extract of *Ascaris lumbricoides*. . . . The authors feel that for practical application of the skin test in detecting the presence of *Necator americanus*, the measurable characteristics are too variable, and that group reactions among the Nematodes are not significantly specific."

[The diagnostic technique used with the hope of determining whether in fact the "negatives" were negative is nowhere stated, a matter of primary importance.]

C. L.

KITAMURA (K.). Sensibilitätsänderungen der Haut gegen Hakenwurmlarven durch intrakutane Impfungen der Stoffwechselprodukte dieser Larven. [**Local Reactions to Intracutaneous Injection of Extracts of Hookworm Larvae.**]—*Japanese Jl. Dermat. & Urol.* 1932. Feb. Vol. 32. No. 2. [In Japanese pp. 104–111. With 8 figs. on 2 plates. German summary p. 11.]

If extract of infective larvae of *A. caninum* in Ringer's solution is repeatedly injected intradermally into the same spot on a rabbit's back, the reaction becomes less and less, and that spot reacts less to the entry of the larvae themselves than does the skin of a normal animal, even if the point of infection into the latter has previously been injected with Ringer's solution.

C. L.

KAWANISHI (S.). Befunde in Magensaft bei Necator-Wirten. [**The Gastric Juice in Hosts of Necator.**—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1931. Nov. Vol. 30. No. 11 (320). [In Japanese. Germany summary pp. 87–88.]

Kawanishi infected 3 healthy men by mouth and 3 by skin with necators and examined the gastric juice 3 times in each case, once before infection, a second time while leucocytosis and eosinophilia were marked, and a third time after disinfestation. The results were these :—

	Oral infection			Skin infection		
		Cases			Cases	
	1	2	3	4	5	6
Total acidity at examination 1	60	61	43	56	46	61
" " 2	87	79	32	66	34	58
" " 3	78	70	38	63	40	60
Free HCl at examination 1	0.106	0.172	0.084	0.146	0.065	0.153
" " 2	0.172	0.180	0.066	0.139	0.069	0.095
" " 3	0.142	0.168	0.066	0.124	0.106	0.146

Little relationship was found between degree of infection and gastric acidity. The method of determining freedom from infection is not mentioned in the German summary. C. L.

FOSTER (A. O.) & DAENGSVANG (S.). **Viability and Rate of Development of the Eggs and Larvae of the Two Physiological Strains of the Dog Hookworm, *Ancylostoma caninum*.**—*Jl. Parasitology*. 1932. June. Vol. 18. No. 4. pp. 245–251.

"The method of McCoy for obtaining hookworm eggs free from feces and growing the larvae in pure cultures of bacteria presented a means of comparing the viability and rate of development of the eggs and larvae of the two physiological strains of *Ancylostoma caninum*. For eggs of the dog strain, there was obtained a percentage hatching of 89 per cent. at 21°C. and 50 per cent. at 31°C. as compared to 28.5 per cent. and 20 per cent. respectively at similar temperatures for the eggs of the cat strain. Studies of the development of the eggs to the infective larval stage showed, for the dog strain, 44 per cent. at 21°C. and 47 per cent. at 31°C., and for the cat strain, 5 per cent. at 21°C. and 6 per cent. at 31°C. From these figures the percentage development of hatched larvae to the infective larval stage was computed. For larvae of the dog strain, this figure was 49 per cent. at 21°C., and 94 per cent. at 31°C., while for the cat strain, the figures were 17 per cent. and 30 per cent. respectively. These findings add to the number of experimentally demonstrated differences between the cat and dog strains of *A. caninum*."

[For McCoy's method see this *Bulletin*, Vol. 27, p. 426.] C. L.

FOSTER (A. O.) & CORT (W. W.). **The Relation of Diet to the Susceptibility of Dogs to *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 241–265. With 4 graphs. [24 refs.]

The normal diet used was of cooked pig lung, bread, powdered milk, yeast and cod liver oil; it maintained dogs in health and vigour.

The deficient diet was of " 35 per cent. corn starch, 35 per cent. dried ground peas, 29 per cent. mazola oil, 1 per cent. NaCl (C.P.), and an abundant supply of water "; it was readily eaten, satisfied hunger, was very deficient in all vitamins and important minerals and poor in protein, and produced rapid loss of weight and general decrease in bodily vigour. Infection was by feeding with numbered larvae given in double capsules, stools were sieved, and eggs were counted by Stoll's technique; but D.C.F. was relied on to disclose light infections since Stoll's technique could not detect them, and this condition, as was shown, persisted in one case for 17 weeks. Nine dogs were used. As regards infectivity, the dogs showed resistance to infection when on the normal diet, but receptivity when on the defective one, infectivity being displayed by appearance or definitely increased numbers of eggs, beyond what were explicable by the erratic variations in counts sometimes apparent. As regards variation in egg production, in one dog (538) on deficient diet for a fortnight after infection with 500 larvae the eggs per day numbered 318*, a fortnight later 1,027 when normal diet was resumed, and six weeks later merely a positive to D.C.F. but when the dog, reinfected after treatment to disinfection as measured by D.C.F., was kept on the deficient diet, the count rose to 29 in 4 weeks and fell steadily to 9 in 8 weeks. Its companion (522) showed changes almost exactly parallel. Since the second fall in egg counts did not coincide with a change in diet, it seems unreasonable to ascribe the first fall to this change. Both falls were accompanied by passage of significant numbers of worms in the faeces. In 3 other dogs a change from normal to deficient diet took place 16 days after their last infection. Five days later, at the next weekly numbering their egg counts were 145, 74, and 96; 7, 7, and 5 weeks afterwards they were 1,113, 746 and 525, an increase of 5 to 10 times with no intermediate experimental infections. Another dog (668) infected with 1,000 larvae showed, while on normal diet, an average of 315 eggs in weeks 3 to 7, was put on deficient diet, with average egg counts 315, 388 and 408 in the next three 5-week periods, and of 1,422 in the subsequent fortnight, after which it was treated. Its pair (709) infected with 500 larvae showed a maximum count of 1,555 five weeks later and an almost steady fall to 11 during the next six weeks, again accompanied by passage of significant numbers of worms; when then changed to deficient diet eggs showed, though with marked irregularities, an increase to 578 eight weeks afterwards. The author's conclusions are:—

" We advance as a working hypothesis the view that in human hookworm heavy infestations may be more easily built up in people on deficient diets, and that not only the injury of the worms to their hosts may be reduced, but also that the worms themselves may be partially or wholly eliminated by improvement in diet alone."

[At least in proportion as their experiments are viewed as unimpeachable, so does the egg count as a measure of worm numbers suffer yet more damage in prestige.] C. L.

FAUST (Ernest Carroll). **The Symptomatology, Diagnosis and Treatment of Strongyloides Infection.**—*Jl. Amer. Med. Assoc.* 1932. June 25. Vol. 98. No. 26. pp. 2276–2277. [13 refs.]

The life history of the parasite is reviewed including Faust's observation that infective larvae may be produced in the intestine itself. In

* All figure of eggs in thousands, i.e., 318,000

considering differential diagnosis of rhabditiform larvae there is the note, "in freshly passed stools the hookworm embryos are almost always within the unhatched eggs." Faust is satisfied that "occasionally parasitic females and males are passed in diarrhetic stools. . . . The rare parasitic males are practically indistinguishable from the free-living males of the indirect cycle." It is noted that the acute local inflammatory reaction in the lungs, the result of migration of the larvae from the capillaries into the bronchioles, "parallels the bronchial pneumonitis observed in ascariasis" but has not been reported for hookworm infestation. At least 200 cases have been treated on Faust's advice with gentian violet, and of 47 followed up 45 have been disinfested. The treatment [*ante*, p. 70] is continued for from 7 to 10 days, but in 4 cases 2 courses were needed. [Perhaps the terms applied to pulmonary lesions have been misunderstood by the reviewer, but it seems wise to point out that for hookworm infections pulmonary lesions were illustrated by LOOSS (1911) in the second part of his monograph and were amply confirmed by BLACKLOCK and ADLER (*Annals of Tropical Medicine and Parasitology*, 1922, Vol. 16, p. 291). Regarding symptoms, LOOSS points out that as early as 1880 BOZZOLO and PAGLIANI in drawing attention to the St. Gothard tunnel anaemia, commented on irritant skin troubles, and on subsequent pulmonary symptoms preceding the anaemia. Apart from intermediate observations PAYNE (*American Journal of Hygiene*, 1923, Vol. 3, p. 584) reported evidence of catarrh of the air passages after infection by 69 hookworm larvae and the condition has since been observed.] C. L.

HEDRICH (W.). Ueber einen Fall von seltener Darmparasitenerkrankung (*Anguillula intestinalis*) bei einem Bergarbeiter des Zwickauer Reviers.—*Klin. Woch.* 1932. May 14. Vol. 11. No. 20. pp. 866-867.

SCHMIDT (Adam.) Beitrag zur Biologie der *Anguillula intestinalis*. [*Biology of Strongyloides stercoralis in a Miner.*].—*Zent. f. Bakt. I.* Abt. Orig. 1932. Mar. 30. Vol. 124. No. 3/4. pp. 177-180. [17 refs.]

A miner who had never been further afield from Zwickau than Serbia showed sexual free living forms of *Strongyloides stercoralis* when his stools were cultured over a period of 5 months. This, it is pointed out, is contrary to LEICHTENSTERN's hypothesis of geographical distribution of forms showing heterogony [see this *Bulletin*, Vol. 23, p. 759]. Eosinophilia and wasting were marked. Neosalvarsan and oral gentian violet are advised in treatment. C. L.

MILLER (J. J.), Jr., MCCOY (O. R.) & BRADFORD (W. L.). **Intravenous Treatment in Experimental Trichiniasis.**—*Jl. Amer. Med. Assoc.* 1932. Apr. 9. Vol. 98. No. 15. pp. 1242-1245. [14 refs.]

Since the death rate of trichinosis in man is only about 6 per cent. animal experiments are necessary to evaluate trichinocidal drugs; and since the number of larvae recovered from 50 gm. of muscle in rabbits (diaphragm 3, tongue 4, masseter 5, abdominal 8, intercostal 10, thigh 20 gm., were the details used) when this quantity was digested in pepsin and hydrochloric acid varied from animal to animal, when these had been fed with the same number of encapsuled larvae,

the number of animals used must be considerable before results can be trusted. Although the number used in these experiments was not large there was no demonstrable therapeutic effect when infected animals were injected, rabbits apparently always intravenously, with various drugs. The drugs tested on rabbits were neoarsphenamine, antimony and potassium nitrate, acriflavine base, rivanol, gentian violet, metaphen and Lugol's compound iodine solution, and in rats sodium iodide intraperitoneally. C. L.

PENSO (G.). Présence des oeufs d'oxyures en pleine muqueuse intestinale et biologie des oxyures. [**Biology of Oxyurids. Presence of Eggs in Intestinal Mucosa.**]—*Ann. Parasit. Humaine et Comparée*. 1932. May 1. Vol. 10. No. 3. pp. 271–275. With 6 figs. on 1 plate.

The occasional presence of oxyurids within the wall of the human appendix is established. TROISIER and DESCHIENS (*Ann. Parasit. Humaine et Comparée*, 1930, Vol. 8, p. 562) have reported the complete perforation of the intestine by oxyurids in the chimpanzee. Penso reports that the eggs of *O. ambigua* of the hare can be found in the intestinal gland lumen. From these facts the following conclusions are drawn. In oxyurids, copulation takes place in the intestine; the females then enter the intestinal wall and oviposit; this explains the rarity of eggs in the stool and the reappearance of infection after treatment, for the eggs need never leave the host (unless to pass infection on to another host when the female migrates out of the anus) for infection to persist in him. C. L.

O'CONNOR (F. W.) & HULSE (C. R.). **Some Pathological Changes associated with Wuchereria [Filaria] bancrofti Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 445–454. With 1 chart in text & 22 plates.

This sumptuously illustrated paper deals with a boy of 12½ years who had spent 11½ years in endemic Porto Rico and the last year in non-endemic New York. There, examination during an attack of acute pneumonia disclosed palpable lymph glands in axillae, epitrochlear regions and groins and a fairly large soft swelling in the right inguinal region. The pneumonic fever did not cause the disappearance of microfilariae from the blood, and ten days after it ceased by crisis the swelling in the right inguinal region was excised.

“Believing LANE's hypothesis (1929 and 1931) of cyclical parturition to be correct, and considering later observations recorded by the author (1931) regarding the possible hour of parturition, the following view was expressed at the time of operation: “If living female worms are present the condition of intra-uterine development will be identical in each parasite and, considering the time when the operation is being performed, it is expected that ova but no microfilariae will be present in the uteri of the parasites.”

By cutting the whole excised mass into serial sections this prognostication was exactly fulfilled. Twenty-one adult filariae were identified in 3 of the 5 glands removed, 2 containing none, and it is estimated conservatively that these 3 glands probably contained originally from 26 to 30 of them. They were accompanied by marked pathological changes (the evidence for and character of which must be sought in the original) in one who had complained of no symptoms and whose infection was disclosed merely as the result of a

routine examination. Hyperfilariation may occur then in the first decade of life. Most filariae in glands lie in the afferent approaches or cortical sinuses. The evidence confirms the hypothesis that cyclical parturition is the cause of filarial periodicity, suggests that parturition of the periodic *W. bancrofti* of Porto Rico occurs about midday, and shows that it is filariae and not bacteria which cause the pathological changes of filariasis, while these changes are in some way associated in the main with aseptic degeneration and absorption of dead adult filariae. The evidence for these conclusions is fully set out in print and picture. C. L.

O'CONNOR (F. W.). **The Aetiology of the Disease Syndrome in *Wuchereria bancrofti* Infections.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol 26. No. 1. pp. 13–33. [51 refs.]

The text for the carefully arranged line of argument of this paper lies in this sentence: 'That the presence of bacteria is necessary to the occurrence of most of the pathological changes and all the inflammatory phenomena associated with filariasis is here called into question as not proved,' and an attempt is made to revalue the respective roles of bacteria and worms in this infection. The first step consists in the production of evidence that there exists a local, even a minutely local, topographical correlation between the symptoms which have been grouped together as chronic filariasis, the filaria, and its insect vector; next is marshalled evidence showing that there is no real correlation between chronic filariasis and those bacteria with which it has been deemed to be associated, the case being strengthened by the examples of other diseases involving the lymphatics in which bacteria are not a factor; and the evidence is summed up in the conclusion "It will be seen that there is no consistency in bacteriological findings in filarial infection. The presence of . . . organisms has been demonstrated, but no bacterium has been found that can be directly associated with a series of filarial conditions which is as specific in type as pneumonia or typhoid." When there is entrance of bacteria into filarial tissues this is held to be secondary; thus during recovery from acute filarial lymphangitis there is intense itching, scratch marks are a feature of the condition, and their sufficiency to introduce secondary bacterial infection is obvious. The massive serial section method employed by O'Connor has led to the conclusion that, while adult parasites live, no serious inflammatory or obstructive phenomena develop though obliterative endolymphangitis may appear; but that on their death conditions are quite otherwise. Degeneration of adult parasites occurs in one of 3 ways; by calcium deposit in the worm, by lymph coagulation, and by a combination of the two. Similarly, so long as microfilariae live, there is no evidence that they damage the tissues; but "evidence is accumulating to show that the microfilariae of *W. bancrofti* are born one day and die the next" and that in dying they do damage tissues.

Acute filarial lymphangitis is considered from the points of view of anatomy, haematology, symptomatology and treatment, and it is held that this acute reaction is allergic in character and corresponds to a period when sufficient protein is liberated from recently dead worms to overcome the resistance set up by previous sensitization. It is concluded, then, that the pathological and acute inflammatory changes found [they are particularly described] are due to the filariae themselves, living or dead. This conclusion presupposes hyperfilariation;

and the evidence of many observers for its existence is put forward, with the suggestion that, since many worms have already been found after examination of small blocks of tissue taken from the near-normal person, in cases showing advanced filariasis evidence for the existence, past or present, of hundreds of worms in one individual will eventually be obtained.

The discussion was informative. The President, Dr. G. Carmichael Low, recalled his paper read before the Society in 1908 where he instanced the case of Grenada where, with an insect intermediary present and infected Barbadians reaching the island, there was no filariasis, and that he gave it as his then conviction that the worm was the essential factor in the disease; he had long been cognizant of heavy infections. Dr. MANSON-BAHR listed the congenital and acquired forms of elephantiasis in man. Dr. CHESTERMAN drew analogies with other filariae and instanced hyperfilariation in Loa. Dr. Hamilton FAIRLEY commented on the fitness of things in that one of MANSON's pupils should now be making conspicuous additions to the knowledge of a disease which so greatly appealed to MANSON, dealt with the allergic reaction, and recounted a case where delayed, persistent and extensive wheal-formation followed intradermal injection of antigen into an elephantoid limb. He believes that a negative reaction to *Dirofilaria* antigen might well prove to be of more value in excluding filariasis as a cause of elephantiasis than the reverse, and did not regard it as a satisfactory means of detecting circulatory antibody in filariasis though eminently so in Loa infection. Dr. BUXTON stressed the importance of investigating the near-normal man, and suggested that while differences in types of disease in different countries might be due to differences in the worm, it seemed to him more probable that they depended on small differences in lymphatics in different races of man. Col. Clayton LANF suggested that the use of the lymphatic or blood "escalator," and the local "suitability" of tissues, reached by the infective larvae through the use of these mechanisms, adequately explained the distribution of the adults which O'Connor had demonstrated. He deprecated the suggestion that the muzzled microfilaria could pass actively through tissues, and hoped that O'Connor's further investigations would reveal the happenings of the cryptic 12 hours between midday which, as O'Connor's work already showed, was the hour of parturition for periodic *W. bancrofti* and midnight the hour at which microfilariae were massed in the circulating blood. C. L.

BRUG (S. L.). Filariasis en elephantiasis. [**Filariasis and Elephantiasis.**—*Nederl. Tijdschr. v. Geneesk.* 1932. June 4. Vol. 76. No. 23. pp. 2772-2776.]

The reputed causal relationship of filarial infection and elephantiasis is still subject to attack and criticism but no writer has seen fit to remove elephantiasis from the filarial diseases to those of unknown causation. An investigation of a population in which some suffer and some are free from filarial infection shows that it is the latter who are afflicted with elephantiasis. The correlation is a negative one, but none the less a correlation. It is not the same persons who show both conditions but it is the same community. And yet there exists no proportionality between the filarial index and elephantiasis frequency. The latter may be very variable in localities with the same worm index. Some other factor than filarial infection must be the explanation of the development of elephantiasis. Clinically it is known that

this affection is preceded by attacks of lymphangitis and fever, which last a few days and return again in a few weeks time. These attacks by degrees account for the condition of elephantiasis. It is not the filariae which cause the lymphangitis, for the great majority of sufferers from filariasis do not have lymphangitis. It must be caused by bacterial infection and especially by streptococci. A further proof of the connexion between these two conditions is afforded by the occurrence of "relapsing lymphangitis," especially among these communities affected by filariasis. During an attack of lymphangitis all micro-filariae disappear from the blood and it seems reasonable to explain this by the death of microfilariae and perhaps of the adult worms. The sequence may be given as, filariae, lymph stasis, predisposition to bacterial lymphangitis, recurrent lymphangitis with progressive thickening of the skin, death of filariae, elephantiasis. It is to be admitted, however, that the explanation is still hypothetical in some respects. In the Dutch East Indies *Filaria malayi* is more common than *Filaria bancrofti*. Some evidence is furnished to show that the former is more associated with elephantiasis of the legs and the latter with elephantiasis of the genitalia.

W. F. Harvey.

PATERSON (James C.). **Observations on Filariasis in Colombia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 169-176. With 1 chart.

The first case of recognized filariasis found at Barranca was in November, 1929, though examination of records shows a surprising number of nonvenereal inguinal bubos admitted to hospital during the last few years. Paterson describes 12 cases which have come under his care during the last 2 years, all substantiated by the finding of *Mf. bancrofti* in the night blood. Points of importance are: (1) the extreme fewness of microfilariae, so many examinations being often needed that enthusiasm has waned, and few direct diagnoses are now attempted. (2) The slightness of symptoms, often merely an enlarged and tender groin gland, myositis once and elephantiasis once. The treatment found most effective in lessening symptoms, though it appeared to influence microfilarial numbers not at all, consisted in T.A.B. injections, the first dose varying from 50 to 100 millions, while each was followed by a rise in temperature to about 104°F. Half the cases showed immediate relief of their symptoms and no relapse occurred within observation periods of 7 to 22 months. In two persons relapse occurred, though in one murdering bandits curtailed the desired observation period. The elephantiasis case was not bettered. Though the infections were so slight they were disabling and commercially significant. The labour, drawn from districts bordering the Magdalena river, is of age between 20 and 30 years. C. L.

HOFFMAN (W. A.), MARIN (R. A.) & BURKE (A. M. B.). **Filariasis in Porto Rico.**—*Porto Rico J. of Public Health & Trop. Med.* 1932. Mar. Vol. 7. No. 3. pp. 312-358. With 6 figs. & 1 map on 4 plates. [19 refs.]

A detailed survey of great local importance already in part reported on [this *Bulletin*, Vol. 26, p. 544]. The author's conclusions are:—

"During the course of a survey having for its object the study of the incidence of filariasis, 4,950 individuals were examined in various localities of Porto Rico."

"The disease is present in a number of communities of the eastern, western and northern coasts.

"Aguadilla and parts of San Juan are the most important endemic foci.

"Caguas, in the interior, is an endemic area of some importance.

"Infection with *Mansonella (Filaria) ozzardi* has been found on one occasion in a person who has always lived in Porto Rico." C. L.

KHALIL (M.), HALAWANI (A.) & HILMY (I. S.). **On the Transmission of Filariasis Bancrofti in Egypt.**—*Jl. Egyptian Med. Assoc.* 1932. June. Vol. 15. No. 6. pp. 317-322.

"1. *Culex pipiens* is a most efficient intermediate host of *Wuchereria bancrofti*. It is also the most common Egyptian mosquito. The females of this species which were fed on filarious individuals showed 100 per cent. infection of larval filariae. None of these larvae showed degeneration or chitinisation.

"2. The larva of *Wuchereria bancrofti* completes its cycle in about 14 days at a temperature of 29°-31° C., in about 15 days at 26°C. and in about 20 days at 23°-24°C.

"3. The mature larva either makes its way direct to the head and then to the proboscis, occasionally to the palps, or it wanders first in the haemocoel before it goes finally to the head.

"4. The larva moults twice; the first moult is about the 5th-7th day and the second is about the 11th day." C. L.

THOULON (L.). Sur quelques accidents consécutifs à l'infestation filarienne, observés au Gabon (1929-31). [**Symptoms of Filarial Infestation seen in Gabon.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 234-237.

Whereas, Thoulon writes, it seems admitted that nearly all doctors in French West and Equatorial Africa dismiss filariasis as practically negligible, he notes that in a community of 35 Europeans, in Gabon, F.E.A., with whom he has been in daily contact, this is not the case, for 14 of them had, he states, an established filarial infection and 6 of them showed more or less serious symptoms. These consisted of itching, Calabar swellings, and the passage of Loa worms about the eye, together with anaemia and nervousness. One he had to invalid home.

C. L.

JAME (L.) & JUDE (A.). Hydrocèle filarienne. [**Filarial Hydrocele.**—*Rev. Méd. et Hyg. Trop.* 1932. Jan.-Feb. Vol. 24. No. 1. pp. 17-20.

A man of 50 who had served many years in Martinique was admitted to the Urological Service, Val-de-Grâce, for a right hydrocele with some discomfort. The scrotal skin was normal. The mass proved to be a chylocele containing many living active microfilariae measuring 250 μ long and identified as *Mf. bancrofti*. Although they were stained and examined no sheath is mentioned. There were no microfilariae in the night blood and no eosinophil cells at all.

C. L.

HARLEY (G. W.). **A Theory regarding the Rôle of Insect Saliva in Filarial Periodicity.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 487-491. [14 refs.]

"It is the purpose of this paper to suggest the hypothesis that there is a specific positive chemiotaxis acting on the microfilariae to cause them to

migrate toward the saliva of the host insect, and that this same chemical substance in the insect's saliva may act as a stimulant to initiate parturition in the female filaria."

It is evidently an active migration which is postulated here. In this way is explained the finding, described by O'CONNOR [this *Bulletin*, Vol. 28, p. 681], of microfilariae reaching the blood vessels of the spermatic cord; by a positive chemiotaxis they took the shortest route to a definite attraction, that of the insect's saliva which would at that hour be in highest local concentration in the blood. When the foreign protein of insect saliva becomes concentrated in lymph gland or kidney, the microfilariae will be attracted in those directions to their final destruction. Similarly since, it is stated, "O'Connor has observed that the time necessary for the development of mature ova into microfilariae is roughly 12 hours," and since parturition occurs about noon, these facts invite the speculation that the biting insect's saliva may possibly furnish the stimulus or release from the inhibition of a "resting stage," which is believed to occur at an early period of development of the ovum, and so initiate the process of cyclical reproduction. The bite of a hyper-infected *Culex fatigans*, which insects are particularly active in the dark phases of the moon, may possibly, by the injection of saliva saturated with filaria protein, initiate an attack of lymphangitis in one already sensitive to filarial protein. C. L.

CRAIG (Chas. F.). **The Possible Chemotactic Effect of the Salivary Secretions of Certain Insects upon Microfilariae.**—*Science*. 1932. May 27. Vol. 75. No. 1952. pp. 561-562.

In reference to the finding of STRONG [*ante*, p. 82] that microfilariae of *O. caecutiens* are more numerous in the transmitting fly than in an equivalent quantity of blood drawn direct, Craig says that ASHBURN and himself reported a similar phenomenon in 1907. In investigating the development of the microfilaria of *W. bancrofti* in *C. quinquefasciatus* they noted that blood ingested by the mosquito contained many more embryos—40-50 times as many—than they could find in approximately the same amount of blood from the patient. The matter, he thinks, merits further study. A. G. B.

DUNN (Lawrence H.). **A Simple Method for collecting Adult Filarial Parasites from Muscle Tissues of Monkeys.**—*Jl. Parasitology*. 1931. Dec. Vol. 18. No. 2. pp. 111-112.

FAUST informed the Gorgas Memorial Laboratory that a filaria parasitizing the squirrel monkey *Leontocebus geoffroyi* inhabited the muscles. No success having attended Dunn's attempt to extract these very delicate worms, about 9 cm. long, a successful attempt was made to induce them to migrate actively and collect themselves. The technique finally adopted was to flay the animal immediately after death, cut off the feet, remove the viscera, allow the body to cool for a few minutes, separate the muscle groups with a scalpel, wash with water to remove blood which would later hinder clear vision of the parasites, immerse the body in normal saline, and place in an incubator at 99°F. for 2 to 4 hours. Some of the filariae at least escape into the fluid and are readily collected. Their genus and species are unnoted. C. L.

HAUER (Aug.). Kasuistischer Beitrag zur Symptomatik und zum Blutbild der Loainfektion. [**The Symptoms and Blood Changes in Loa Infestation.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 181–185.

The report concerns 2 men with no microfilariae in the blood. In one, the first skin symptoms suggestive of *Loa* infection occurred 3 years after he first reached and 1½ months after he finally left an endemic area. Eosinophilia was a marked feature in both cases, up to 75·5 and 78·5 per cent. C. L.

GORE (K. B.). **Cases of *Dracunculus medinensis*.**—*Jl. Roy. Army. Med. Corps.* 1932. Apr. Vol. 58. No. 4. pp. 288–289. With 1 text fig.

From May to September, 1931, eleven guineaworm cases were admitted to the Indian Military Hospital, Kowloon, Hong Kong, all contracted in Hissar, Punjab, India, with an average incubation judged as ten months. Ten cases were plural infections; thus eight worms were removed from one man, 5 whole and 3 broken, cellulitis and abscess developing in these 3. Treatment was by douching and immersing the part in cold water, injection into the worm of 2 per cent. cocaine solution, and gentle and gradual traction. Urticaria might be associated with the blister formation. C. L.

CONNELL (W. K.) & BUCHANAN (J. C. R.). **Guinea Worm Disease in Tanganyika.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. p. 99.

This is believed to be the first recorded case of dracontiasis *acquired** in Tanganyika. This Indian's movements are accounted for over a period, so far as can be judged, of something under a year, which does not seem completely to cover the possible incubation period. This and three other cases mentioned constitute all the references to guineaworm in the medical records of the Territory. C. L.

MÜHLENS (P.). Ueber Filarieninfektionen in Sud- und Mittelamerika, insbesondere *Onchocerca caecutiens* in Mexiko. (Sammelreferat).—[**Filariasis in South and Central America, especially *O. caecutiens*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. May. Vol. 36. No. 5. pp. 287–300. [Refs. in footnotes.]

A valuable review of the literature for German readers.

C. L.

BOUCHER (L.). Une Infection multiple par les helminthes.—*Rev. Méd. et Hyg. Trop.* 1932. Mar.–Apr. Vol. 24. No. 2. pp. 79–82.

BÜCHNER (S.). Askaridenkuren bei Kindern mit Helminal.—*Muench. Med. Woch.* 1932. July 29. Vol. 79. No. 31. p. 1241.

DRAKE (D. C.) & COULTER (J. L. S.). A Case of Schistosomiasis Vesicae.—*Jl. Roy. Nav. Med. Serv.* 1932. Apr. Vol. 18. No. 2. p. 134.

HIGAZI (Ibrahim). Bilharzial Papilloma of Lower End of Ilium causing Intussusception and Undergoing Malignant Change.—*Jl. Egyptian Med. Assoc.* 1932. May. Vol. 15. No. 5. p. 303.

*Italics in original.

- HIGAZI (Ibrahim). Bilharzial Tumour at the Tip of the Appendix causing Intestinal Obstruction.—*Jl. Egyptian Med. Assoc.* 1932. May. Vol. 15. No. 5. pp. 303-304.
- KHALIL (Mohamed) & HASSAN (Aly). The Serum Globulin in Human Schistosomiasis.—*Jl. Egyptian Med. Assoc.* 1932. May. Vol. 15. No. 5. pp. 211-231. [14 refs.] [See this *Bulletin*, Vol. 29, p. 411.]
- KITAMURA (K.) & NAKAMURA (M.). Weitere experimentelle Studien ueber Dermatitis durch Hakenwurmlarven.—*Japanese Jl. Dermat. & Urol.* 1932. Apr. Vol. 32. No. 4. [In Japanese pp. 307-317. With 1 chart. [22 refs.] Germany summary p. 39.]
- I.ODATO (Gaspere). Bilharziosi vesicale e reperto di *Bullinus*, *Melania* e *Limnaea* in alcune località del Fezzan (Tripolitania).—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 235-240. English summary (5 lines).
- LONGO (Domenico). Intradermoreazioni specifiche e aspecifiche nell'echinococchi.—*Polichinico. Sez. Med.* 1932. Apr. 1. Vol. 39. No. 4. pp. 202-208. [23 refs.]
- NAJERA (L.). Una nuova tecnica per la numerazione di uova di elminti nelle feci (camera di Zschucke).—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 207-214. With 3 text figs. English summary (4 lines).
- NAKAJIMA (Katsumi). Experimental Study on the Development of *Anchylostoma duodenale*. (Third Report.) Development of Larvae of *Anchylostoma duodenale* Dubini obtained from the Lung of Percutaneously Infected Puppy and subsequently given to Rabbit.—*Japanese Jl. Experim. Med.* 1932. Apr. 20. Vol. 10. No. 2. pp. 115-122. With 7 figs. on 1 plate.
- PIERI (Gino). Appendicite acuta da tricocefalo.—*Polichinico. Sez. Prat.* 1932. Mar. 21. Vol. 39. No. 12. pp. 458-460. With 1 text fig.
- POSSELT (Adolf). Erster und einziger Bericht ueber einen spontanen und sichtbaren Durchbruch von Askariden durch den Nabel und zwar bei einer Erwachsenen.—*Schweiz. Med. Woch.* 1932. July 16. No. 29. pp. 661-663. [24 refs.]
- SPOTO (Pompeo). Sindrome tossica da *Ascaris lumbricoides* in soggetto malarico.—*Riv. Sanitaria Siciliana.* 1932. Mar. 15. Vol. 20. No. 6. pp. 401-406, 409-411. With 2 charts. [13 refs.] English summary (5 lines).
- VAN THIEL (P. H.) & WOLFF (A. E.). Een vergelijking der chemische methoden tot het scheiden van de larven der mijnwormen van mensch en dier van die der vrijlevende nematoden.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June 21. Vol. 72. No. 13. pp. 836-841. [See this *Bulletin*, Vol. 29, p. 422.]
- WILLOUGHBY (Hugh). The Treatment of Intestinal Helminthic Infections in Man.—*Jl. Roy. Nav. Med. Serv.* 1932. Apr. Vol. 18. No. 2. pp. 112-115.

TYPHUS AND UNCLASSED FEVERS.

BRUMPT (E.). Le typhus bénin ou maladie de Brill est une infection endémique des rats parisiens (*Mus norvegicus*). [**Benign Typhus an Endemic Disease of Parisian Rats.**]—*Bull. Acad. Méd.* 1932. Mar. 8. 96th Year. 3rd Ser. Vol. 107. No. 10. pp. 356–360. [12 refs.]

The author refers to the work in America and in Greece on the same lines; his observations were made in Paris where the disease in man is not met with except for a few imported cases, whereas Greece and America are endemic areas. Rats (*Mus norvegicus*) were captured in the city and killed; emulsion of the brains injected into guineapigs produced fever and testicular enlargement typical of American typhus virus. The rat flea *X. cheopis* is rare on rats in Paris; hence few cases in man. The author considers that endemic typhus is a disease of rats exceptionally transmitted to man; and he compares the relation of typhus of the old world and Brill's disease to that of variola and vaccinia. *D. Harvey.*

NETTER (Arnold). Le typhus endémique de l'homme et du rat dans la région parisienne et l'intervention de "*Xenopsylla cheopis*." Développement et localisation de "*Rickettsia prowazeki*" dans le corps des puces. Présence du virus dans leurs déjections. Si le rôle des rats dans la conservation du virus est établi, le pou conserve le rôle primordial dans la transmission, et la lutte contre ce parasite reste la base indiscutée de la prophylaxie du typhus. [**Endemic Typhus of Man and of the Rat in the Region of Paris and the Part played by *X. cheopis*.**]—*Bull. Acad. Méd.* 1932. Mar. 22. 96th Year. 3rd. Ser. Vol. 107. No. 12. pp. 408–412.

The author describes 9 cases of mild endemic typhus which were under his care in the Trousseau Hospital in Paris in the year 1916, in children convalescent from scarlet fever; there was a profuse rash which did not involve the face; all 9 made a good recovery. In one instance the blood was injected into a guineapig which developed fever; after recovery from this reaction it was shown to be immune to inoculation of Tunisian typhus virus (epidemic). Netter has no doubt that these were cases of Brill's disease and remarks that rats were seen in the ground floor ward in which the children slept.

The rest of the paper is taken up with a review of the recent work in America and Europe and the author stresses the point that cases of endemic typhus are mild and few in number because the virus is passed through the rat, and because the rat flea in the faeces of which the germs are present only in small numbers only rarely bites man; whereas in epidemic typhus the virus is passed directly from man to man by the body louse and the germ is present in the faeces of this parasite in enormous numbers. Prophylaxis against epidemic typhus is therefore founded on lousing. *D. H.*

BRUMPT (E.). Le typhus des rats sauvages du nouveau et de l'Ancien Monde est-il identique au typhus humain? [**Is Rat Typhus Identical with Human Typhus?**]—*Bull. Acad. Méd.* 1932. Mar. 22. 96th Year. 3rd Ser. Vol. 107. No. 12. pp. 416–420. [10 refs.]

Brumpt like other observers has been struck with the ease with which the "virus" of typhus can be obtained from wild rats by the intra-peritoneal injection of an emulsion of the brain into guineapigs, not

only in endemic centres of the disease but also where the disease is non-existent as in Paris. He therefore puts the question—Is the typhus of wild rats identical with the human virus?

He refers to the work of MOOSER and his co-workers in America and also to a paper by ZOZAYA, *Jl. Infectious Diseases*. 1930, Vol. 46, p. 18. This worker inoculated a guineapig (which had already been solidly immunized against typhus) with the scrotal fluid from an infected guinea-pig containing very numerous "Mooser bodies" (Rickettsia). After an incubation period the immune guineapig developed a scrotal reaction and the scrotal fluid, which now contained numerous "bodies," was injected into other guineapigs which also gave the scrotal reaction. This fluid injected into a human volunteer gave no reaction and the Weil-Felix reaction remained negative. ZOZAYA argues from this that the "Mooser bodies" (Rickettsia) are not the virus of typhus but represent another and distinct virus which causes the testicular swelling in guineapigs. Brumpt also refers to the recent work of NICOLLE [below] which showed that the injection of an emulsion of the brain of normal guineapigs into guineapigs and rats produced swelling of the testicle and caused the appearance of Rickettsia-like bodies. In view of these findings Brumpt declares that further research is necessary before we can consider the rats of Europe as reservoir of the virus of typhus. Two things at least require explanation—Why is it that when an emulsion of the brain of rats is inoculated into guineapigs not only fever but also testicular swelling (Mooser reaction) almost invariably appears, whereas the inoculation of the blood of cases of typhus fever, either mild or grave, in male guineapigs, only results in fever? Another curious thing is the frequency with which this rat virus reaction in guineapigs appears in Europe; in America out of 81 rats examined MOOSER only found two carriers of the virus, yet in Toulon, Greece and Paris, from 50 to 100 per cent. of the rats were found to be infected. In this connexion it should be remembered that in the laboratory the typhus virus is only viable in rats and guineapigs for about 10 days. In view of the impossibility of foretelling the result Brumpt does not suggest the inoculation of man with the rat virus but the blood of cases of endemic typhus might be injected into a large series of guineapigs to see if the "Mooser reaction" develops.

D. H.

NICOLLE (Charles) & LAIGRET (Jean). Présence d'une bactérie, analogue aux *Rickettsia*, dans la tunique vaginale des cobayes et des rats, inoculés par voie péritonéale avec des produits non virulents. [**A Rickettsia-like Organism in Tunica Vaginalis of Rats and Guineapigs inoculated Intraperitoneally with Non-Virulent Substances.**—*C. R. Acad. Sci.* 1932. Mar. 7. Vol. 194. No. 10. pp. 804-807.]

MOOSER noted that in guineapigs inoculated with the virus of Mexican typhus very numerous Rickettsia bodies could be demonstrated in the swollen tunica vaginalis; he stated also that the material which contained the greatest number of Rickettsia was the most virulent inoculum for other animals. The authors failed to correlate the number of Rickettsia with the virulence of the inoculum; in some cases the germs were very numerous, in other cases few and in others none could be seen, and yet the material in their hands proved

equally capable of producing infection. They inoculated normal guineapigs intraperitoneally with normal brain tissue and phosphate of calcium separately and mixed, and were astonished to find in the tissues of these animals numerous Rickettsia like bodies indistinguishable from those seen after inoculation with typhus virus. The suggestion is made that these bodies are already present in the animals and the inoculation of brain tissue and phosphate causes a multiplication.

D. H.

LÉPINE (P.), CAMINOPETROS (J.) & PANGALOS (G.). Présence du virus du typhus exanthématique chez les puces des rats d'Athènes et du Pirée. [**Presence of Typhus Virus in Rat Fleas of Athens and Piraeus.**—*C. R. Soc. Biol.* 1932. Mar. 11. Vol. 109. No. 9. pp. 710-712.

Rats were captured in various parts of Athens and Piraeus and the fleas collected, counted and identified; usually 2 to 6 were found per rat. Some of the fleas were dissected and stained to demonstrate Rickettsia; the remainder were ground up, emulsified and injected intraperitoneally into guineapigs. These animals developed fever after an incubation period of 4 to 5 days. The authors noted that the reaction after injection of the emulsion of fleas was much more marked than after that of brain and blood of rats and this suggests a multiplication of the virus in the flea. It was found that if more than 12 fleas were employed infection invariably resulted and as few as 2 *X. cheopis* produced an infection. This flea is the most heavily infected and also the most common (96 per cent.) of the rat fleas.

D. H.

LÉPINE (Pierre). Existence, en Grèce, d'une forme endémique du typhus exanthématique. Rôle du rat et des puces comme réservoir et vecteurs de cette affection. [**Endemic Typhus in Greece. Rats and Fleas as Reservoirs and Vectors.**—*Bull. Acad. Méd.* 1932. Apr. 12. 96th Year. 3rd Ser. Vol. 107. No. 14. pp. 495-499.

The author believes that endemic typhus is fairly common in Greece but is confused clinically with eruptive fever and epidemic typhus, the severe cases being called typhus and the mild cases, especially if there is a rash on the hands and feet, eruptive fever ("fièvre boutonneuse").

He describes two cases; in one the blood inoculated into volunteers did not infect, but numerous rats were found in the patient's bedroom; some of these were caught and killed and emulsion of the brains was inoculated into guineapigs; these animals gave the typical reaction of Brill's disease. Fleas of the species *X. cheopis* collected from the rats and injected into guineapigs gave the same reaction. In the other case the blood of the patient inoculated into guineapigs gave the typhus reaction (Brill's) and these animals were subsequently shown to be immune to the local (Athens) virus and also to a strain of true typhus virus.

D. H.

LÉPINE (P.) & CAMINOPETROS (J.). Action, sur le virus exanthématique des rats d'Athènes, du sérum de malades guéris du typhus exanthématique et de la fièvre boutonneuse. [**Action on the Typhus Virus of Athens Rats of Serum of Convalescents from Typhus and Eruptive Fever.**].—*C. R. Acad. Sci.* 1932. Apr. 11. Vol. 194. No. 15. pp. 1277-1280.

A guineapig was infected with the strain of typhus virus obtained from rats in Athens. The brain was removed and emulsified and one portion mixed with normal serum and another portion with the serum of persons recovered from epidemic or true typhus; after $\frac{1}{2}$ hour contact the mixtures were inoculated into other guineapigs. The guineapigs inoculated with the virus+normal serum both reacted but neither of the two inoculated with virus+typhus convalescent serum. These two animals were subsequently reinoculated with Athens virus; one reacted, the other did not, the inference being that in one case the serum (convalescent) had completely neutralized the virus, and in the other only partially. In a second experiment the local virus was treated with (1) normal serum, (2) serum of convalescents from Brill's disease (endemic typhus), (3) serum of convalescents from eruptive fever. Sera 1 and 3 had no effect on the virus whereas the serum of convalescents from the local endemic typhus neutralized it. *D. H.*

LÉPINE (P.). Présence du virus du typhus exanthématique dans l'encéphale des rats capturés à Beyreuth. [**Presence of the Typhus Virus in Brains of Rats captured in Beirut.**].—*C. R. Soc. Biol.* 1932. Apr. 15. Vol. 109. No. 12. pp. 1072-1073.

The author obtained rats from Syria (Beirut) where there was a camp of Armenian refugees in which many cases of Brill's disease had occurred. In February 1932, 14 rats were received at the laboratory; 7 *M. decumanus* were killed and their brains emulsified and injected intraperitoneally into guineapigs. These animals reacted with fever and intense testicular swelling and oedema. They were then killed and cultures of all the organs proved to be sterile. Rickettsia were demonstrated in smears of the tunica vaginalis. Seven *M. alexandrinus* from the same batch or rats were likewise killed, the brains emulsified and injected into two guineapigs; one of these animals which reacted and recovered was shown to be immune to injection of the Athens typhus (endemic virus); the other animal which had not reacted was later shown to be susceptible to this virus. *D. H.*

DES ESSARTS (J. Quérangal). Présence d'un virus exanthématique sur les rats d'un navire de guerre, au Port de Brest. Rats et puces des rats à Brest. [**Presence of Typhus Virus in the Rats on a Man-of-War in the Harbour of Brest.**].—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 283-286.

Two cases of "ship typhus" occurred at Brest on board a cruiser laid up in harbour there for one year after a long stay at Toulon. A search for the virus was carried out on the lines of MOOSER and NEILL in America. Rats on board the cruiser, on shore and on other ships were caught and examined; of the rats caught on the cruiser 79 per cent. were *M. rattus*, 18 per cent. were *M. norvegicus*, 3 per cent. were *M. alexandrinus*; whereas of the rats captured on shore 60 per cent. were *M. norvegicus*, 38 per cent. were *M. rattus*.

Of the rats whose brains were injected into guineapigs positive results, fever and testicular reaction, were obtained with specimens of *M. rattus* captured on the cruiser, whereas rats captured on shore and on other ships gave negative results. D. H.

MARCANDIER & PIROT (Robert). Transmission de l'homme au cobaye (après passage par le rat) du virus typhique toulonnais (typhus endémique bénin des navires de guerre). [**Transmission of the Virus of Endemic Typhus from Man to the Guinea-pig after Passage through the Rat.**—*C. R. Acad. Sci.* 1932. May 9. Vol. 194. No. 19. pp. 1693-1694.

The blood of a patient suffering from mild typhus on board a ship in Toulon harbour was taken at the height of the fever and injected into a rat. This animal developed fever and was killed, the brain was removed and emulsified and injected into a male guinea-pig which duly developed fever and typical swelling of the testicle. This human virus was later shown to protect guinea-pigs against the virus obtained from rats on the same ship. D. H.

DYER (R. E.), WORKMAN (W. G.), BADGER (L. F.) & RUMREICH (A.). **Typhus Fever. The Experimental Transmission of Endemic Typhus Fever of the United States by the Rat Flea *Ceratophyllus fasciatus*.**—*Public Health Rep.* 1932. Apr. 22. Vol. 47. No. 17. pp. 931-932.

A few fleas, *Ceratophyllus fasciatus*, collected from rats trapped in Savannah were placed in a glass box in which was a clean white rat on which they fed and bred. Twelve of these fleas were taken, emulsified and injected into two guinea-pigs without any result, i.e., they were non-infective. Three rats previously infected with the virus of endemic typhus were then placed in the box and the fleas fed on them. Later 5 fleas were removed and injected into 2 guinea-pigs; both reacted typically and the virus was passed in series and identified by the following criteria:—

1. Production of fever and testicular swelling in guinea-pigs.
2. Blood cultures of guinea-pigs taken during fever, sterile.
3. Intracellular Rickettsia present in smears from tunica vaginalis of guinea-pigs.
4. Typical histopathological changes discovered in brains of inoculated guinea-pigs.
5. Development of Weil-Felix reaction in sera of rabbits inoculated with the virus.
6. Successful crossed immunity tests.

Conclusion—*Ceratophyllus fasciatus* is a carrier of the virus of Brill's disease. D. H.

DYER (R. E.), WORKMAN (W. G.), CEDER (E. T.), BADGER (L. F.) & RUMREICH (A.). **The Multiplication of the Virus of Endemic Typhus in the Rat Flea *Xenopsylla cheopis*.**—*Public Health Rep.* 1932. Apr. 29. Vol. 47. No. 18. pp. 987-994.

These workers have shown that the virus of endemic typhus is present in rat fleas and in the faeces of such fleas, and that the virus is not transmitted to the egg or larva; they have failed to produce infection by the bite of the flea. In the present work 100 young fleas hatched from eggs of typhus infected fleas were placed in Box 9.

Eighteen of these fleas were taken, emulsified and injected into 2 guinea-pigs—no reaction. Again 27 more were taken and injected with a like negative result; it was therefore concluded that the remaining fleas in the box were non-infective. Two months later 200 fleas were taken from Box 9 and placed in Box 17; 3 infected rats were placed in this box for 24 hours and then removed and killed and placed with the accompanying fleas in Box 17 A. Sixteen of these fleas were taken and emulsified and injected into a clean rat: this procedure was repeated day by day until the 8th day after the infecting feed. In this first experiment it was noted that the incubation period in the inoculated rats became shorter after the first 2 or 3 days but too many fleas had been used as it was found that an amount of emulsion equivalent to $\frac{1}{80}$ of a flea would infect. Accordingly a second experiment on the same lines was carried out but only 8 fleas were taken each day; these were emulsified and the emulsion diluted so that the equivalent of $\frac{1}{8}$, $\frac{1}{16}$ or $\frac{1}{32}$ of a flea could be inoculated. Later on as little as $\frac{1}{100}$ of a flea was used. The results are displayed in tabular form and show that one day after the infecting feed $\frac{1}{8}$ of a flea fails to infect whereas $\frac{1}{32}$ of a flea will infect later. Apparently the multiplication of the virus which takes place in the flea reaches its maximum about the 5th to 6th day after the first infecting feed; 40 days after this feed $\frac{1}{100}$ dilution gave a positive result. The strain of virus obtained in this way was identified by the usual criteria. D. H.

DOVE (Walter E.) & SHELMIER (Bedford). **Some Observations on Tropical Rat Mites and Endemic Typhus.**—*Jl. Parasitology*. 1932. Mar. Vol. 18. No. 3. pp. 159–168. With 5 plates. [11 refs.]

The authors had previously studied the tropical rat mite in relation to a case of dermatitis in man caused by its bite. In view of recent work on Brill's disease which has shown that the virus of the disease can be carried by insect parasites of the rat, the authors have conducted a series of experiments with the tropical rat mite. They found that if rat mites are fed on infected guineapigs and emulsified and injected into non-immune guineapigs intraperitoneally these develop fever and scrotal swelling and Rickettsia can be demonstrated in the tunica. Also clean mites were fed on infected guineapigs and then at varying intervals fed on other guineapigs; some of these animals developed fever but not scrotal swelling; when, however, the blood of these animals was injected into others fever developed and also scrotal swelling and Rickettsia could be demonstrated. It is evident then that the virus of the disease can be carried from guineapig to guineapig by injection of the mites as well as by their bites. Guineapigs which recovered from fever were shown to be immune to injection of the typhus virus. As the rat mites require four blood feeds in the course of their development and leave the host after each feed and are known to bite man, it is possible that they may carry the disease from rat to man. D. H.

MONTEIRO (J. Lemos). Typho exanthematico de S. Paulo. X. *A Rickettsia brasiliensis e suas relações etiológicas com a infecção. [Rickettsia brasiliensis as the Cause of S. Paulo Typhus.]—Brasil-Médico*. 1932. Apr. 23. Vol. 46. No. 17. pp. 385–390. [13 refs.]

The author carried out a large number of inoculations of the virus of the S. Paulo type of typhus (using the blood or emulsion of the brain of

infected animals) into guineapigs, to determine, if possible, the aetiological relationship between the Rickettsia and the disease.

After injection he killed and examined in all 212 animals: Among 21 killed before the onset of fever, *i.e.*, 3-4 days after inoculation, he found Rickettsia present in 15 (71.4 per cent.); on the first day of fever in 5 out of 5, on the second day 30 out of 32 (93.7 per cent.), on the third 38 out of 42 (90.4), on the fourth 28 out of 40 (70); after the fourth day or on the day of natural death after that interval in 40 out of 72 (55.5). Eight were killed and examined during convalescence or several days after the temperature became normal; none of these was positive. Altogether the Rickettsia were seen in 156 of the 212, or 73.5 per cent. and the proportion of positives fell from 100 per cent. (5 out of 5) on the first day of fever to 70 on the fourth and 55.5 later in the fever, disappearing in convalescence.

After inoculation of the virus into the anterior chamber of the eye the Rickettsia were found in the endothelial cells of Descemet's membrane; after intraperitoneal inoculation, in the endothelial cells of the peritoneal wall. These cells containing the bodies, after repeated washing and centrifuging, when injected into fresh guineapigs again set up the disease, while a vaccine prepared from them is capable of producing immunity by the formation of viricidal antibodies.

H. H. S.

PIJPER (Adrianus) & DAU (Helen). **Cross-Immunity between South African Typhus and Tick-Bite Fever.**—*Brit. Jl. Experim. Path.* 1932. Feb. Vol. 13. No. 1. pp. 33-35. With 1 text fig.

The virus of South African typhus (a mild form of typhus not carried by lice) produces regularly a febrile reaction in guineapigs; animals which have reacted are immune to further inoculations of the same virus. The virus of "tick-bite fever" produces a febrile reaction in guineapigs although not so regularly as does the typhus virus; animals which have reacted to tick-bite virus are immune to further injections of the same virus.

Animals which had reacted to typhus virus were found to be immune to injections of the virus of tick-bite fever; but on the other hand animals which have reacted to the virus of "tick-bite fever" were not immune to injections of typhus virus.

D. H.

KEMP (H. A.). **Active Immunity to Endemic Typhus Fever as Produced by Formolized Infected Tissue.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Jan. Vol. 29. No. 4. pp. 353-355. [3 refs.]

Formolized tunica prepared according to Zinsser's method and administered intraperitoneally in 4 weekly doses of 1 cc. each to non-infected guineapigs brought about in test animals immunity to at least 200 times enough virus to cause a scrotal reaction in 4 days. But it would appear that this immunity is not lasting and its production is accompanied by marked reaction to the relatively large quantities of vaccine substances employed. The vaccine retains its potency only for a short time.

D. H.

SATO (Kiyoshi). Dauerkultur von Fleckfiebererregern in Vitro. [Continuous Culture of the Germ of Typhus Fever.]—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 466-470. With 1 plate.

NAGAYO and his co-workers injected typhus virus into the eyeball of rabbits and reported that they found Rickettsia in the endothelial cells. The author repeated this work but was unable to demonstrate the organisms in the cells, but only contaminating bacteria; but by employing the cells of Descemet's membrane for culture inoculum he has been able to produce a continuous culture of the virus, and the virulence of this culture was proved by injection into animals.

Method of culture.—The heart blood of an infected guineapig was drawn off and centrifuged and 0.3 cc. of the leucocytic layer was injected into the anterior chamber of the eye of a normal rabbit; after 1 or 2 days the eyeball was extirpated and portions of the endothelial layer of Descemet's membrane carefully removed; small portions of this infected membrane were mixed with small pieces of fresh normal membrane and placed in a slide chamber on a medium consisting of 1 part normal aqueous humor, 4 parts rabbit plasma. The plasma coagulates and two or three drops of aqueous humor are added. The culture is then incubated at 37°C. for 2 days and later at 30°C. for 8 days. When subcultures are made it is necessary to add small portions of fresh normal endothelial layer of Descemet's membrane as living cells are essential for multiplication of the germs. The virulence of the culture is tested by injection of 0.2 cc. of the fluid into guineapigs, either intracerebrally or intraperitoneally. A positive result was shown by fever and a monocytosis in the blood and the discovery of typhus nodules in the brain and liver of the guineapigs.

Method of demonstrating the Rickettsia.—Endothelial tissue which had been cultured for 4 days was taken, spread on a slide and thoroughly dried. This slide was first treated with Loeffler's mordant for flagella staining, then deeply stained with Wolbach's fuchsin.

Basic fuchsin	...	...	0.5
Phenol	...	...	1.0
Anilin	...	...	0.5
3 per cent. alcohol	...	...	100.0

The preparation was then washed in formalin and differentiated with picric acid solution.

The author considers that this method is much superior to Giemsa's stain as the latter shows up many granules in the cell protoplasm which confuse the picture. By the fuchsin method a study of the morphology of the organism is possible.

D. H.

KODAMA (M.), TAKAHASHI (G.) & KOHNO (M.). Natural Hosts and Disseminators of *Rickettsia manchuriae* (a Preliminary Note).—*Kitasato Arch. Experim. Med.* 1932. Feb. Vol. 9. No. 1. pp. 84-89.

Manchurian typhus is a mild sporadic form of typhus and the authors classify it with Brill's disease. They have already described a Rickettsia as agent. They refer to the researches of various workers in America, MOOSER, DYER, et al., and have carried out work in their district on similar lines. They selected two towns each with 15,000 Chinese inhabitants, in which about 500 cases of typhus had occurred in 1928. 240 rats were trapped and killed and the fleas removed, counted

and identified, and utilized for inoculation purposes. Emulsions made of the brains of the rats were injected intraperitoneally into male guineapigs. Emulsions were also made of batches of fleas and injected into the testicular parenchyma of other guineapigs.

Results.—Of the 240 rats 16 gave a positive result in the guineapigs, demonstrated by fever and testicular swelling; the virus was also passed in series to other animals. The predominant species of flea found were *X. cheopis* and *Ceratophyllus anisus*; the former was the more numerous and positive results were obtained by inoculation of emulsion of batches of this flea but not with *C. anisus*. Rabbits inoculated with strains of this virus developed a positive Weil-Felix reaction in their serum. *D. H.*

HOSHIZAKI (Soyo). **On the Tissue Cultivation of the Virus of the So-called Manchurian Typhus Fever.**—*Kitasato Arch. Experim. Med.* 1932. Apr. Vol. 9. No. 2. pp. 155–170. With 4 charts in text & 2 figs. on 1 plate.

Small portions of the tunica vaginalis of guineapigs infected with the virus of Manchurian endemic typhus were taken and many Rickettsia were demonstrated in the epithelial cells and also some free in the plasma. The minimum infective dose of this tissue was ascertained by experiment and a portion containing 10 such units was employed for tissue culture. After ten days in the culture fluid the piece of tissue was removed for examination as to number of Rickettsia and also for injection into guineapigs. It could be readily observed that the number of Rickettsia had increased at least 100 times and the number of infective units to the same degree. Subculture was also attempted by the following method: portions of normal tissue (tunica) were placed in the plasma culture along with the piece of infected tissue. These normal "pieces" were twice the size of the infected "pieces." At the end of 10 days the normal piece was removed and cut in half, one portion being used for test and the other portion being used as infective "piece" to carry on the culture, a new normal piece being added to it. By this method Rickettsia could be demonstrated in the normal pieces to the 3rd generation and these were also infective; at the 5th generation Rickettsia could no longer be seen but the piece was infective. Apparently the virus could be cultured in series although the virulence and the number of Rickettsia did not run parallel. *D. H.*

KODAMA (Makoto), TAKAHASHI (Kensaburo) & KONO (Michio). **On Experimental Observation of the So-called Manchurian Typhus and its Etiological Agent (*Rickettsia manchuriae*).**—*Kitasato Arch. Experim. Med.* 1932. Apr. Vol. 9. No. 2. pp. 97–133. With 2 charts in text & 9 figs. on 2 plates. [31 refs.] [Summary appears also in *Bulletin of Hygiene*.]

Clinically there are two types of typhus in Manchuria, true typhus (epidemic louse borne) and endemic typhus or Brill's disease. In the present investigation the authors employed 4 strains of the virus of Manchurian typhus (endemic) M.T.V. and 2 strains of true typhus virus (epidemic) T.T.V. When guineapigs are inoculated with these viruses the febrile reaction is much the same in both and there is also loss of weight and a monocytosis but in guineapigs inoculated with Manchurian virus (endemic) M.T.V. the Neill-Mooser reaction, N.M.R., is produced, that is, redness and oedema of the testicles; this does not

occur in animals inoculated with true typhus virus T.T.V. This reaction, N.M.R., develops quickly, reaches the maximum quickly and quickly disappears. Histologically 'another difference can be made out; if guineapigs which have reacted to T.T.V. are killed and the brain examined numerous "typhus nodules" will be readily found whereas in animals inoculated with M.T.V. only a few nodules or none may be seen. Crossed immunity experiments in guineapigs are positive with M.T.V. and T.T.V. Rabbits inoculated with M.T.V. give the Mooser reaction and also their serum gives a positive Weil-Felix reaction; in white rats also fever and slight swelling of the testicle is noted but not the positive Weil-Felix reaction.

The authors have also found that very occasionally swelling of the testicle may be noted in guineapigs after inoculation with T.T.V. but this reaction is not in any way comparable to that produced by the virus of Brill's disease and this property of the latter virus is not altered by passage through mice or white rats. The authors demonstrated the Rickettsia in the tissues of inoculated animals especially in the tunica vaginalis of animals inoculated with M.T.V. and a full description of the morphology and staining reactions of these organisms is given. A few Rickettsia were noted also in the spleen of guineapigs but not elsewhere in the tissues. If testicular swelling is produced by injection of true typhus virus Rickettsia can be found in the tunica vaginalis but never in such large numbers as are found after injection of the virus of M.T.V. The authors conclude that the *R. manchuriae* is similar to *R. prowazeki* although it differs somewhat in the effect it produces on inoculation into animals.

D. H.

KODAMA (Makoto), KONO (Michio) & TAKAHASHI (Kensaburo). **Demonstration of *Rickettsia manchuriae* appearing in the Stomach Epithelial Cells of Rat Fleas and Rat Lice Infected with So-called Manchurian Typhus.**—*Kitasato Arch. Experim. Med.* 1932. Apr. Vol. 9. No. 2. pp. 91-96. With 4 coloured figs. on 1 plate.

Wild rats were captured in Dairen, Manchuria, and lice and fleas collected from them. These rat lice and fleas were fed on rats which had been infected with the virus of Manchurian typhus (Brill's disease), and smear preparations and sections were made from the stomachs of these insects. Amongst the wild rats captured two carriers of the virus were discovered and in 3 *cheopis* fleas obtained from these rats Rickettsia were demonstrated in the epithelial cells of the stomach. Rickettsia also were readily discovered in the epithelial cells of the stomach of fleas which had been fed on rats experimentally infected with the virus; in addition a white rat was infected and lice collected from it showed Rickettsia; these findings are well illustrated in coloured plates. Control lice and fleas fed on normal rats were uniformly negative for Rickettsia.

D. H.

MUKERJI (D. M.). **Cases of Tick-Typhus in a Town.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. pp. 86-87. With 1 text fig.

Three cases of tick typhus which occurred in the city of Nagpur are described. The rash was typical and there was also conjunctivitis and sleeplessness. The Weil-Felix reaction was negative in all. In one case the patient stated that he had removed a tick from his arm 17 days before the fever commenced.

D. H.

KIRSCHNER (L.) & KUIJER (A.). Diagnostiek en kliniek van tropical typhus. [**Diagnosis and Symptoms of Tropical Typhus.**]*—Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Feb. 2. Vol. 72. No. 3. pp. 153-164. [38 refs.] English summary.

Fifty-two cases of tropical typhus were observed by the authors in Java, 25 in Europeans, 20 in natives and 7 in Chinese. All the patients gave a positive Weil-Felix reaction with *Proteus* X₁₉ in the O form in a titre of over 1/200. 1,400 controls were carried out in other fever cases and with normal bloods; all were negative. The authors found that suspensions of living bacilli were best for the test and alcohol treated bacilli next. Clinically the cases were typical, not severe, with maculo-papular rash, face red, eyes congested and absence of rash on the mucous membrane of the mouth; the mortality was low. D. H.

KAWAMURA (Rinya) & IMAGAWA (Yoso). Aetiologische Studien ueber Rocky-Mountain Spotted Fever. [**On the Cause of Rocky Mountain Spotted Fever.**]*—Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 472-476. With 2 figs. on 1 plate.

The author received a number of infected ticks from Dr. PARKER of Montana. Some of these ticks were fed on guineapigs and some were emulsified and injected into guineapigs; all these animals reacted with the specific symptoms of the fever. Blood, omentum, testicle and brain were taken from these guineapigs and injected into others into brain, peritoneum, testicle and muscle; all gave positive results. Redness and swelling of the testicle was noted and in the later stages gangrene of the organ. For microscopical examination fixation by Rigaud's method and staining by Giemsa were employed; *Rickettsia* in large numbers were seen in the muscle cells of the middle coat and in the endothelial cells of the blood vessels of the testicles and tunica vaginalis, but not in the endothelial cells of Descemet's membrane or in the omentum. *Rickettsia* were also found in certain large cells in the brain substance.

Two points of difference between *R. rickettsia* and *R. orientalis* were noted. The first is found in the cells of the walls of the blood vessels, the latter in the reticulo-endothelial system. *R. rickettsia* is a diplo-bacillus or bacillus whereas *R. orientalis* is pleomorphic. D. H.

FISHER (L. C.). **Chemotherapy of Experimental Spotted Fever.***—Proc. Soc. Experim. Biol. & Med.* 1932. Feb. Vol. 29. No. 5. pp. 633-635. With 1 text fig.

The strain of virus used in these experiments was derived from a patient in Minnesota—an exceptionally mild type of Rocky Mountain Fever. The animals used were guineapigs and the usual course of the fever after inoculation was carefully studied in these animals. The drugs employed were Germanin (Bayer 205), metaphen, triphal (an organic gold compound) and tryparsamide; suitable doses of these drugs were injected on the first day of fever but none had any effect on the temperature curve in the experimental animals. D. H.

NAGAYO (Mataro), SATO (Kiyoshi), MIYAGAWA (Yoneji), MITAMURA (Tokushiro), TAMIYA (Takeo) & HAZATO (Hikozaemon). Ueber die Kultur des Erregers der Tsutsugamushi-Krankheit, *Rickettsia orientalis*, unter Anwendung der Gewebezüchtungsmethode. [Culture of the Germ of Tsutsugamushi Fever and the Use of the Tissue Culture Method.]-*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 411-425. With 18 figs. on 4 plates & 5 text figs. [Refs. in footnotes.]

It is now generally agreed that *Rickettsia orientalis* is the cause of this disease. This has been specially confirmed by the development and multiplication of the *Rickettsia* in the anterior chamber of the eye of rabbits inoculated with the virus of the disease. It had been noted that in infected animals the parasite multiplied within the cells of the tissues and specially in the endothelial cells of Descemet's membrane; therefore tissue culture naturally suggested itself as a useful line of research. It had also been shown that the *Rickettsia* retain their vitality for some weeks in plasma culture from the infected testicles of rabbits and also there was definite evidence of multiplication of the germ in such cultures. Other workers have utilized lung and spleen as the tissue for culture. The authors have employed as tissue of choice the endothelial cells of Descemet's membrane taken from the eye of normal rabbits; such cells multiply in culture and are the site of selection for the *Rickettsia* in the infected animals.

Rabbit plasma was used as the culture medium and several strains of virus obtained from human cases of the fever were employed; these strains had been shown to be virulent for rabbits and monkeys. The cultures were made as a rule in hanging drop cells as these could be readily observed under the microscope, and the culture mixture was made as follows—3 drops of the fluid from the anterior chamber of the eye of a normal rabbit + a small piece of the germ-free endothelium of Descemet's membrane + 0.5 cc. of rabbit plasma. The inoculum was either a few drops of aqueous humor from the eye of an infected rabbit or a portion of the membrane from the same eye; the whole is well mixed and ringed with paraffin and incubated at 37°C. for two days, and subsequently at 30°C. for the remainder of the time; for subculture a few drops of the mixture is carried over to a new culture medium. The duration of the culture was usually about ten days. In four days multiplication of the *Rickettsia* could as a rule be seen, but the maximum was not reached till about the 7th day. In the primary culture development was slower, but the parasites could usually be observed, plentifully by the 14th day; it was therefore necessary to use as inoculum heavily infected fluid or tissue.

For purpose of observation the best method is to remove some of the cell mass and to fix and stain this for examination. The *Rickettsia orientalis* will be found very numerous in some of the new cells; not all cells are infected, some may show only a few parasites and others may be crammed with *Rickettsia*. A few of the parasites may also be observed free in the plasma, also degenerated forms may be seen along with degenerated cells. The typical *Rickettsia* have the usual morphology, diplococci and bipolar forms, and stain readily with Giemsa. The results of animal experiments are shown in tabular form. Strain I was passed through 11 culture generations; each generation was tested and found to be infective for rabbits and monkeys; these animals after recovery were shown to be immune to subsequent

injections. Strains II, III and IV were also tested in a similar fashion and shown to be infective. The period from first isolation to the 11th generation was 89 days. *D. H.*

KIMURA (Ren), FUJISAWA (Yosio) & MISUGI (Yositosi). Studien ueber die Tsutsugamushikrankheit in der Gewebezuechtung. [**Tissue Culture in Tsutsugamushi Disease.**]*—Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 426–431. With 2 figs. (1 coloured) on 1 plate.

The authors had already done similar work in dealing with vaccinia virus in tissue culture, using testicle, lung, kidney and spleen of rabbits. They therefore decided to carry out research with the virus of Japanese River fever. The strain utilized was obtained from Professor OGATA. The tissue used for cultural purposes was small portions of the testicle, lung and spleen of normal rabbits and these were injected *in vitro*; the material for the culture medium was the plasma and spleen extract of the same animal. The strain of virus utilized was highly virulent and rabbits were readily infected by injection into the eyeball or testicle. The tissue employed for culture was placed in Tyrode's solution and then emulsion of an infected testicle was mixed with it, two or three pieces of this tissue were then added to the spleen extract, plasma medium described above and left in the incubator for one week. When there was good growth of the tissue cells these were divided into two portions, one portion was removed for examination and the other used for secondary culture. The supernatant fluid was injected into the testicle and anterior chamber of the eye of rabbits, a positive result being recorded after microscopical examination of the testicle, and the appearance of typical iritis in the eye. The portion of tissue removed from the culture was also fixed and stained for microscopical examination and in positive cases numerous *Rickettsia orientalis* could be seen as they were also in the cells of the testicle and endothelial cells of Descemet's membrane in injected animals. The results of the culture experiments are given in tabular form. The 1st table refers to cultures in which the rabbit's testicle was used, the 2nd those in which lung tissue, and the 3rd the spleen tissue; in all 3 series the virulence of the virus was tested in all generations of the cultures up to 10 and in all it remained the same. The total period from the commencement of the experiment was 72 days; subcultures were made once a week and all 3 tissues gave the same positive results. *D. H.*

NISHIBE (Masujiro), MIYAZAWA (Masae) & HOSONO (Sichiro). **The Multiplication of *Rickettsia orientalis*, the Virus of Tsutsugamushi Disease, in Tissue Cultures.***—Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 431–440.

It has been proved that the virus of tsutsugamushi disease remains alive in plasma for at least 29 days if subcultured every 5 days; and the *Rickettsia* have been shown to multiply by microscopical examination. Two strains of the virus were utilized in this research and the material for inoculation was the infected testicle of rabbits; cultures were made in Carrel flasks and the medium employed was made up of 2 parts rabbit heparin plasma, 1 part chick embryo juice, in Tyrode's solution, and the whole was incubated at 38°C. Estimations were made of the number of *Rickettsia* in a portion of the original inoculum,

and the numbers present after incubation in the culture for ten days. Small pieces of the infected testicle were emulsified in Tyrode's solution and the emulsion was diluted 5, 10, 100 and 1,000 times and 0.4 cc. of each dilution was injected into the testicles of normal rabbits. In the same way small pieces of the same infected testicle which had been cultured and incubated for 10 days were removed and emulsified and diluted and 0.4 cc. injected. The minimum amount of the emulsion which caused definite orchitic lesions in the rabbit's testicle was taken as the tsutsugamushi unit or t.u. Using this method it was shown that the Rickettsia content of the emulsion had increased 100 times in ten days. D. H.

NISHIBE (Masujiro), HOSONO (Sichiro) & MIYAZAWA (Masae). **A New Method for the Demonstration of the Virus of Tsutsugamushi Disease.**—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 441-448. With 4 figs. on 1 plate.

The authors consider that the difficulty of demonstrating *R. orientalis* in the tissues of animals is mainly due to the scarcity of the organisms, as they are readily and clearly stained by Giemsa's stain. These organisms have been shown to be contained in the histiocytes in the testicle and skin and in the endothelial cells of Descemet's membrane but not in lymphocytes or red cells but may be found in other phagocytic cells.

Two strains of virus were used in the authors' research and the material used for injection was emulsion of infected testicle in Ringer's solution; 3 cc. of this emulsion were injected *intratracheally* into normal rabbits. These animals were killed at intervals by means of air embolus and were examined, smear preparations being stained by Giemsa's stain and sections by haematoxylin and eosin. Focal pneumonia of the lower lobes of both lungs was found; on microscopical examination after the 5th or 6th day the alveoli of the lungs were found to be filled with large numbers of mononuclear cells (histiocytes) and also alveolar epithelial cells. *R. orientalis* was found in large numbers in these cells but especially in the epithelial cells, which were crammed with these organisms. Control experiments; normal lungs and lungs inoculated with normal testicular emulsion were examined, but nothing resembling the above picture was noted. Cultures were made on ordinary media but only a few cocci were isolated. 10 per cent. emulsions were made of the lungs of infected rabbits and injected into the eye and testicle of rabbits; orchitis and iritis were typically produced in all the animals; 0.5 cc. of the emulsion was injected into the testicle and 0.1 cc. into the anterior chamber of the eye. D. H.

HAYASHI (Naosuke). **On Tsutsugamushi Disease.**—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 448-451.

Hayashi refers to the identification of the causative organism of tsutsugamushi fever. As regard morphology it is polymorphic, showing specially coccal and diplococcal forms. Special "thread" forms (spirilla) have been described in *R. prowazeki* but not so far in *R. tsutsugamushi*, but the author showed a film of blood demonstrating a thread form and also ring forms of the parasite. These organisms occur as a rule intracellularly and generally in endothelial phagocytic cells (histiocytes) but the author declares that they may also be found

in lymphocytes. He also refers to the recent discovery of *Rickettsia* in mites by KAWAMURA, and he points out that there are many varieties of mite, but so far only one has been proved to carry the disease, and *Rickettsia* can be found in all; just as is the case in typhus in lice in epidemic and non-epidemic areas. As regards nomenclature he suggests *R. tsutsugamushi* new genus new species. For prophylaxis the use of inoculations of "Koktigen" and serum have been attended with success.

D. H.

KAWAMURA (Rinya) & IMAGAWA (Yoso). Ueber die Proliferation der pathogenen *Rickettsia* im tierischen Organismus bei der Tsutsugamushi-Krankheit. [The Multiplication of the Virus of Tsutsugamushi Disease in Animals.]—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 455–461. With 2 figs. on 1 plate.

The authors have found that injection of emulsion of the enlarged spleen of field mice causes reaction when injected into rabbits' testicles. and also that *Rickettsia* can be found in the salivary glands of mites removed from these field mice with enlarged spleen. *Rickettsia* have also been seen in small numbers in the blood and lymph glands of subjects of the disease and also in the bone marrow of infected guineapigs; they have specially been noted in the lymph glands draining the area of the site of the primary sore or mite bite, or site of injection in animals, but in all these places the number of the organisms is small and therefore they are difficult to identify. As there are many histiocytes and endothelial cells in the omentum and mesentery and it is in these cells that *Rickettsia* are chiefly found, the authors decided to inoculate animals intraperitoneally with a view to the ready identification of the parasite and diagnosis of the disease. The results are given in tabular form. Animals were killed at varying intervals and the day on which *Rickettsia* appeared in the cells of the omentum, mesentery and mesenteric glands was noted. The order invariably was 1st omentum, 2nd mesentery, 3rd lymph glands. The parasites were most plentiful about the 7th day. Very many endothelial cells of the omentum were found filled with *Rickettsia* which could be readily identified. Guineapigs, rats and mice were used, but guineapigs were found to be the most useful animal.

D. H.

HARA (Y.). Ueber die pathologisch-histologischen Veränderungen der Lymphdrüsen bei der Tsutsugamushi-Krankheit in Formosa. [Histopathological Changes in Lymph Glands in Tsutsugamushi Fever in Formosa.]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1932. Feb. Vol. 31. No. 2 (322). [In Japanese. German summary pp. 13–14.]

Five cases of the disease were studied and enlarged lymph glands were removed during life for examination; these glands were situated in the area draining the site of the initial sore (mite bite). Marked changes were noted both in the medulla and cortex of the glands, and inflammatory changes in the capsule, such as round-celled infiltration, oedema, etc. Hyperplasia and hypertrophy of the reticulo-endothelium and shrinking of the follicles were noted. The occurrence and proliferation of so-called "blister cell" histiocytes was a characteristic change in all areas, and degeneration of these cells and of lymphocytes was also present. This necrosis was specially diffuse in haemorrhagic

areas in the cortex. Plasma cells were rare. These histiocytes were phagocytic and contained erythrocytes, lymphocytes and portions of necrosed cells and also granules; these cell inclusions made an interesting histological picture. D. H.

KAWAMURA (R.), SHIBATA (T.) & IMAGAWA (Y.). Ein Fall von Tsutsugamushi-Krankheit nach Laboratoriums-infection. [**A Case of Laboratory Infection in Tsutsugamushi Disease.**]*—Zent. f. Bakt.* I. Abt. Orig. 1932. May 6. Vol. 124. No. 5/6. pp. 355–360. With 4 text figs.

A young laboratory attendant, an Annamese aged 25, had been assisting in work with the viruses of Rocky Mountain spotted fever, typhus and tsutsugamushi disease; he was taken ill suddenly with severe headache and fever and 3 days later a rash appeared. The differential diagnosis presented some difficulty in view of the opportunity for infection with any of the three viruses and the possibility of typhoid, paratyphoid or of measles. The two latter were excluded by reason of the typical Kedani rash and the blood, urine and faeces were cultivated with negative results. On the 10th day of the fever blood was taken from the patient and injected into guineapigs; these animals were killed for examination and the virus was passed on to other guineapigs. Typical intracellular Rickettsia were demonstrated in preparations from the omenta of these animals and are shown in a photomicrograph. Guineapigs which had recovered from an attack of fever due to the virus isolated from the patient were proved to be immune to the inoculation of the laboratory strain of tsutsugamushi disease but were susceptible to the virus of Rocky Mountain spotted fever and to typhus virus; thus confirming the diagnosis. The authors refer to a previous case of laboratory infection reported by OGATA in which a needle charged with infected material was accidentally inserted into the skin of a worker who developed a primary sore at the site of the puncture with swollen glands and fever and eventually died of the disease. In the present case there was no initial sore and presence of mites could be definitely excluded; the injection of infected material could also be ruled out. The authors suggest that in the course of his work the man became infected through handling infected tissues, the virus entering through a fissure in the skin of the hands and being absorbed directly into the lymph stream. The patient made a good recovery. D. H.

ISHIWARA (K. Kikutaro) & OGATA (Norio). [In Portuguese & German.] Sobre o agente do "Tsutsugamushi." Ueber dem erregder der Tsutsugamushikrankheit. [**The Agent of Tsutsugamushi Disease.**]*—Rev. Med.-Cirurg. do Brasil.* 1932. Mar. Vol. 40. No. 3. In Portuguese pp. 71–75. With 6 figs. on 2 plates. In German pp. 76–81.

I. The conservation and exaltation of virulence of tsutsugamushi virus by means of passage in rabbit testicles.—The authors have shown that monkeys are susceptible to this virus and that typical symptoms, fever, initial sore at site of injection, enlarged glands, etc., are produced and that these animals after recovery from an attack are immune to further inoculations of the virus; rats and guineapigs are also susceptible but do not show any typical symptoms except enlarged spleen; rabbits had previously been but little used in this research.

In 1923 the authors showed that the blood of rabbits if inoculated into the testicles of monkeys produced inflammation and swelling; and later they inoculated the T. virus into rabbits' testicles; 3 weeks after injection the testicle is removed and an emulsion made and inoculated into the testicle of another rabbit. By 1926 in this manner 40 generations had been subinoculated. The usual practice was to inoculate the blood of a human case of the fever into a monkey, then from the monkey into the rabbit's testicle or else from man to rabbit, then to monkey and then to rabbit. Four strains of the virus were employed. The inoculated testicles swell immediately after the injection but soon return to normal size; if removed and sectioned hyperaemia and necrosis are noted but not so severe as after inoculation with smallpox virus although much more marked than after inoculation of normal blood. Usually after 5 passages from testicle to testicle the emulsion of testicle was injected into a normal monkey and produced in this animal the typical symptoms of tsutsugamushi fever; if the animal recovers it is then immune to further inoculations with emulsion of infected testicle or rat spleen; the virus was tested in this manner for 40 passages. The blood of fever cases is usually infective for monkeys but not always so and the animals recover, but when inoculated with testicle emulsion the animals suffer from a severe attack of fever and often die, thus showing that the virulence of the virus has been exalted or that there has been a multiplication of the germ. The virus remains infective in the testicle of the same rabbit for 3 weeks but not for 4. Pieces of infected tissue when placed in culture media were shown to be sterile.

II. Increase in histiocytes and cell inclusions in them.—In sections of the infected testicles if stained by Giemsa very many histiocytes can be seen; these are larger than the leucocytes and the nucleus is stained a dark blue and the protoplasm deep blue. One to three weeks after injection organisms can be seen in these cells, staining blue with Giemsa; the primary form is coccoid but in addition diplococci, rod-shaped forms with bipolar staining, longer rods and comma forms are seen that recall at once the picture of Rickettsia. These organisms are in the protoplasm of the cells, never in the nucleus; 10 days after injection they are most numerous especially the rod forms; they are more readily demonstrated by staining in smear preparations than in sections. In addition to staining with Giemsa and Löffler stain they also stain well with carbol gentian violet but not with Gram. An occasional coccus form may be seen in the lymphocytes.

This work has been confirmed by other workers in Japan but until it is possible to cultivate these Rickettsia-like organisms it is not possible to say that they are actually the germs of tsutsugamushi fever. The author notes the resemblance between the cell inclusions he describes and *Bartonella muris*. D. H.

KAIWA (Jyuji). Untersuchungen ueber die Kedanikrankheit I. Mitteilung. Ueber die Veränderung der Blutgerinnungsfähigkeit. II. Mitteilung. Ueber den Zucker Gehalt des Blutes. [*Researches on Kedani Disease. Part I. Changes in the Coagulability of the Blood. Part II. Sugar Content of the Blood.*]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1932. May. Vol. 36. No. 5. pp. 276-285. [18 refs.]; pp. 285-287. [37 refs.]

Blood was taken direct from a vein and placed in a Leitz coagulometer. Control bloods from normal people were observed at the same

time and under similar conditions. Five cases of the disease were observed. In all the coagulation time of the blood was considerably greater (double or more) than in the normal people. Also in all 5 cases there was a marked reduction in the number of blood platelets and leucocytes. In one case there was a marked reduction in the thrombin content but in the others no significant difference from the normal was noted, but the fibrinogen content was below normal in all cases; on the other hand the calcium content was equal to normal. The blood clot was softer than normal.

The sugar content was tested in the same 5 cases and did not differ significantly from the normal. D. H.

KRAUS (R.). Ueber den derzeitigen Stand der verschiedenen Varietäten des Flecktyphus und ihre biologische Differenzierung. [**Varieties of Typhus Fever and their Biological Differentiation.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 3/4. pp. 353–362.]

A review of the recent advances in our knowledge of the group of typhus fevers. D. H.

NICOLLE (Charles). Nécessité de conserver le nom de fièvre boutonneuse à la maladie dénommée ainsi dès 1910 à Tunis et transmise par la tique du chien. Comprendre sous celui de fièvre exanthématique l'ensemble du groupe de maladies dont le typhus exanthématique du Vieux-Monde est le type le plus anciennement et le mieux connu. Intérêt de la recherche de l'existence de cas inapparents chez les marins de nos navires de guerre. [**Nomenclature of Eruptive Fever and of the Typhus Group of Fevers.**—*Bull. Acad. Méd.* 1932. Mar. 1. 96th Year. 3rd Ser. Vol. 107. No. 9. pp. 292–294.]

Professor Nicolle demands that the name "fièvre exanthématique" in its present significance should disappear, and that the disease in question should be known as "fièvre boutonneuse" not only on grounds of priority but also because the term "exanthématique" causes confusion with the fevers of the typhus group.* The writer also suggests that the term "fièvre exanthématique" should be retained to describe the group of typhus fevers including fièvre boutonneuse, Rocky Mountain spotted fever, Mexican typhus, Malayan typhus, Japanese river fever and Brill's disease.* D. H.

DURAND (P.). Le chien réservoir de virus de la fièvre boutonneuse. [**The Dog as Reservoir of the Virus of Eruptive Fever.**—*C. R. Acad. Sci.* 1932. Mar. 7. Vol. 194. No. 10. pp. 918–919.]

The author considers that the failure to show that the dog is susceptible to the virus of eruptive fever is due to the fact that all dogs are immunized while they are young. He took two pups one month old, born in the winter and therefore never exposed to the bites of ticks,

*Of the names for *fièvre exanthématique*, usually designated in this *Bulletin* "eruptive fever" that of *fièvre boutonneuse* undoubtedly has priority but it is unsuitable for the non-French readers because it cannot be satisfactorily rendered in English. We can hardly speak of "bud" or "button" fever, and "macular" is inaccurate. It is to be hoped that our French colleagues will adopt a more convenient term. Meantime in this *Bulletin* we shall continue the use of "eruptive" fever. [Ed.]

and inoculated them with emulsion of 60 and 90 ticks respectively; no reaction followed but the blood of the pups taken ten days later proved to be infective for a human volunteer. The conclusion is that dogs are susceptible to the virus and act as reservoirs. *D. H.*

DURAND (P.) & LAIGRET (J.). Fièvre boutonneuse et "fièvre de Marseille." Immunité croisée. [**"Fièvre Boutonneuse" and Marseilles Fever.**].—*C. R. Acad. Sci.* 1932. Feb. 29. Vol. 194 No. 9. pp. 798-800.

— & —. La "fièvre de Marseille" immunise contre la fièvre boutonneuse de Tunisie. [**Marseilles Fever immunizes against "Fièvre Boutonneuse."**].—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 422-425.

A large number of the nymph stage of the tick were collected in the suburbs of Marseilles; from these 200 adults emerged. These were washed thoroughly in antiseptic and emulsified and injected into M.B.S., a subject of dementia praecox. This man 5 days later developed a severe attack of fever with typical eruption; his blood taken during the height of the fever proved infective for another man. Two other men received doses of Tunisian virus derived from the brain of gerbilles; both these men developed fever. From a naturally infected case of Tunisian fever the blood was injected into a susceptible person who developed fever; his blood was at the same time inoculated into the four people, two of whom had recently recovered from Marseilles fever, and two from Tunisian fever; none of the four reacted, showing that a previous attack of Tunis fever protected from the Tunisian virus and also that a previous attack of Marseilles fever protected against the Tunisian virus. *D. H.*

DURAND & LAIGRET. Sensibilité de certains rongeurs au virus de la fièvre boutonneuse. [**Sensibility of Certain Rodents to the Virus of Eruptive Fever (Tunis).**].—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 426-429. With 2 text figs.

Two gerbilles were inoculated with the blood from a case of eruptive fever (Tunis); there was no reaction; ten days later the animals were killed, the heart blood was mixed with an emulsion of the brains and inoculated into a patient. This man duly developed typical fever, and his serum later gave a positive Weil-Felix reaction. Exactly the same procedure was followed with two white rats and the same results followed. It is possible that the gerbille in the neighbourhood of Tunis may act as a reservoir of the disease. *D. H.*

DURAND (Paul). La réaction de Weil-Felix dans la fièvre boutonneuse. [**The Weil-Felix Reaction in Eruptive Fever (Tunis).**].—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 395-421. With 17 charts.

The author gives an account of previous work on the Weil-Felix reaction in Tunisian and Marseilles fever and arrives at the general conclusion that so far the reaction in these diseases has been regarded as negative or doubtful.

The present studies were commenced in 1930 and continued up to the end of 1931 and concerned 9 cases of naturally infected people and 13 men experimentally infected. Two of these last were inoculated with

Marseilles virus and eleven with Tunisian. In the 13 experimental infections it was possible to examine the sera on several occasions before the inoculation and in all cases it was found to be negative. Four strains of *Proteus** were employed in the investigation, X_{19} , X_2 in the O form and XK both in O and H form. Positive reactions were obtained in all the cases with the strains X_2 and X_{19} O form but not with XK either in O or H form.

In only one case was the resulting titre not higher than 1/50; in 5 cases it reached 1/100, in 4 1/200, in 3 1/400, in 3 1/1800, in 4 1/2,000 and in 1 case 1/3,200. The more prolonged and severe the infection the higher the titre as a rule. The results are recorded in tabular form. The reaction is rarely as high as that met with in true typhus and does not appear at all during the fever but usually shows first at the end of the first week of apyrexia. Although all the cases gave a positive reaction some reacted better with X_{19} and others with X_2 .

The author concludes that eruptive fever should be included among those diseases which give constantly a positive Weil-Felix reaction.

D. H.

PLAZY & GERMAIN. Un cas de fièvre exanthématique traité avec succès par le sang de convalescent de typhus. [**Case of Eruptive Fever treated by Convalescent Typhus Blood.**]*—Bull. Acad. Méd.* 1932. Feb. 2. 96th Year. 3rd Ser. Vol. 107. No. 5. pp. 152-154. With 1 chart in text. [1 ref.]

A case of eruptive fever contracted on board the French man-of-war "La Bretagne" is described. It was treated by injections of the whole blood of a convalescent from typhus fever, three doses of 20 cc. commencing on the 4th day of the disease. A marked improvement followed and the fever ceased on the 9th day of the disease. [As this infection was contracted on board ship it was probably a case of Brill's disease carried by the rat flea, and not eruptive fever, which is carried by the dog tick; this would explain the action of the convalescent serum.]

D. H.

PLAZY (L.), GERMAIN & PLAZY (M.). Du traitement de la fièvre exanthématique par le sang total de convalescent de la même maladie. [**Treatment of Eruptive Fever by Whole Blood of Convalescent.**]*—Bull. Acad. Méd.* 1932. Feb. 9. 96th Year. 3rd Ser. Vol. 107. No. 6. pp. 205-211. With 4 charts in text.

The authors treated 10 cases of eruptive fever by means of injections of whole blood of convalescents from the disease; 8 of these cases were carried by the rat flea and 2 cases by dog ticks. In 4 cases the course of the disease was markedly shortened and in the others the general condition was improved. In the discussion which followed Professor Roux pointed out that eruptive fever carried by ectoparasites of the rat was really a mild form of typhus and that eruptive fever carried by the dog tick was similar to "fièvre boutonneuse" of Tunis and as the latter name held priority it should stand.

D. H.

* In No. 6 of this Volume, Typhus and Unclassed Fevers, pp. 445, 446 and 452 (RAYNAL, LABERNADIE & PIJPER & DAU) the term *Proteus vulgaris* is used for the organism employed in the Weil-Felix reaction in place of the *B. proteus* of the respective originals. This terminology was adopted in 1928 [*Bull. of Hyg.*, Vol. 3, p. 90] and has been hitherto followed. Dr. Felix points out that the use of *Proteus vulgaris* is not the general practice. For this and other reasons these strains will in future be classed as *Proteus*, and not *Proteus vulgaris*.—[Ed.]

BLANC (Georges) & CAMINOPETROS (J.). Études épidémiologiques et expérimentales sur la fièvre boutonneuse faites à l'Institut Pasteur d'Athènes. [*Epidemiological and Experimental Studies on Eruptive Fever made at the Pasteur Institute of Athens.*]—*Arch. Inst. Pasteur de Tunis*. 1932. Mar. Vol. 20. No. 4. pp. 343–394. With 26 plates & 3 charts. [40 refs.]

The authors agree that the name “fièvre boutonneuse” should stand although it is not a good one since the rash does not consist of “boutons” but of papules and that the name fièvre exanthématique of Marseilles should lapse.

In 1930 the same disease was identified at Volo in Greece and the authors commenced the investigations which are recorded in this paper. One feature of the disease in Greece is the peculiar “patchy” distribution—numerous cases in Volo, a few in the Piraeus, none in Athens, a few also in the desert island of Delos. This distribution has been explained by the authors who found that dog ticks collected from Volo and Piraeus readily infected man whereas dog ticks collected in Athens proved to be non-infective; a single tick from Volo might infect whereas the emulsion of 50 or 60 Athens ticks did not.

Numerous experiments were carried out with dog ticks collected from Volo and elsewhere and the carriage of the virus by these parasites, male and female, larvae and nymphs, was abundantly confirmed; it was also shown that the virus is carried over the winter season in the bodies of the ticks, and that the eggs of infected ticks which had been thoroughly washed were capable of producing infection. The authors argue from this that a vertebrate host such as the dog is not necessary, the virus being carried on in the tick from generation to generation, the dog acting merely as a carrier and feeder of the tick.

The first series of experiments, 9 in all, were carried out on 33 subjects who were inmates of institutions and were suffering from general paralysis or dementia praecox, the fever produced being employed therapeutically. A second series consisted of 52 experiments on 97 subjects.

It was shown that emulsion of ticks was still infective after passage through Chamberland L 2 and L3 filters. Monkeys were shown to be readily susceptible to infection when inoculated with the blood of patients; these animals reacted with fever which lasted about 10 days and during this period their blood was infective for man.

Young dogs were collected from areas where the ticks had been shown to be non-infective and were inoculated with blood of patients and also with emulsions from infective ticks: the dogs did not react. The blood was taken from 9 of these animals at various intervals and inoculated into 28 susceptible people without reaction [Weil-Felix reaction not stated]. The authors are of opinion that dogs are not susceptible and do not act as reservoir. In the same manner rabbits, rats, guineapigs, pigs, sheep and pigeons were all tested, with negative results. However it was found that white mice and a small Macedonian rodent, the spermophile (*Citillus citillus*), were definitely susceptible to infection, the latter animal especially so. Blood from patients was inoculated into white mice, the animals were killed one week later and the brain emulsion inoculated into man; a typical attack of the fever with eruption followed [plates shown]. Spermophiles do not get fever and do not die but the blood is infective for man after an incubation of about 7 days and for about 12 days thereafter, and the infection has been passed in series through many generations

each series being shown to be infective for man ; the virus does not lose in virulence by passage. This rodent is peculiar to Macedonia and does not occur in France or Italy so cannot be the reservoir in these places. In 82 instances transmission of the disease was attempted from man to man ; 50 of these were successful, in 30 there was fever with no eruption, in 7 fever with abortive eruption, in 4 fever with rash on the face only and in 9 fever with typical general eruption, but it is noted that atypical cases may give rise to typical. It was also shown that the red blood cells are infective, as well as the serum, plasma, and washed white cells. Immunity lasts at least two months.

[The numerous photographs of patients give a good idea of the skin eruption.] D. H.

COMBIESCO (D.). Recherches expérimentales sur la fièvre exanthématique constatée à Constantza (Roumanie). [**Researches on Eruptive Fever at Constantza.**—*C. R. Soc. Biol.* 1932. Mar. 11. Vol. 109. No. 9. pp. 793-794.

Continuing his researches [*ante*, p. 455] the author found that the disease could be passed from man to man by inoculation of blood taken during the course of fever ; and that the same quantity from the same donor produced very different results in different people, typical fever in one, mild and atypical in others.

He also found that either the plasma or blood cells produced infection as well as whole blood. After the epidemic had ceased in Constantza 20 dog tick nymphs were collected from several dogs, and having developed into adults were emulsified and injected into two volunteers ; both developed the fever. White mice and the sphermophile were shown to be susceptible. Two dogs obtained from an area free from fever were inoculated with blood from a fever case ; they were not affected in any way ; 10 days later the dogs were bled and a monkey was inoculated ; this animal developed fever and its blood proved infective for man. D. H.

PETZETAKIS. Un cas de fièvre exanthématique observé à Alexandrie. [**Case of Eruptive Fever at Alexandria.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Mar. 14. 48th Year. 3rd Ser. No. 9. pp. 356-358.

In 1928 the author observed a case of fever at Alexandria which was clinically typical of eruptive fever, the first case of the disease noted in Egypt. The subject was a Greek, but he had been resident in Alexandria for several years. The case was not published at the time as the "tache noire" and enlarged glands were not present, and the Weil-Felix reaction taken on the 10th day of the disease was negative. No other cases have been reported. D. H.

KUIJER (A.). Een nieuwe vorm van febris non classificata? [**A New Non-Classified Fever ?**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June 21. Vol. 72. No. 13. pp. 854-866. With 9 graphs.

The author describes an apparently unknown infectious disease of 5-11 days duration with 9 case reports. Five occurred in native soldiers belonging to one company. It is characterized by :—

- (1) acute onset ;
 - (2) bronchitis and exudative pleuritis of early occurrence, without catarrhal symptoms of the upper air passages ;
 - (3) a rash, also early, of a rather varied character (maculo-papulovesiculo-petechial) and disappearing with desquamation ;
 - (4) somewhat painful general swelling of the lymph glands.
- No other characteristic symptoms are mentioned. There were no deaths.

[Except for the facts that the total leucocytes usually were less than 10,000 per cmm. (once only reaching 14,200) and that the monocytes, though increased relatively and absolutely, did not reach so high a proportion as is common in Glandular fever or infective mononucleosis, the symptoms and course of the condition described bear many resemblances to that disease.—Ed.] W. J. Bais.

VAN SLYPE (W.). Un cas de fièvre rouge congolaise. [**Case of Red Congolese Fever.**].—*Ann. Soc. Belge de Méd. Trop.* 1931. Dec. 31. Vol. 11. No. 4. pp. 419-422.

The author met with a case of fever in his district (Dilolo, Jubea district) similar to those described by PIERAERTS [*ante*, p. 454] under the name of "fièvre rouge." The principal clinical features of the disease were profuse pink rash, enlarged glands in the axillae, lymphocytosis, absence of pains in joints and of desquamation. D. H.

CANNAVO (L.). Osservazioni e ricerche in un caso di febbre esantematica mediterranea.—*Riforma Med.* 1932. June 4. Vol. 48. No. 23. pp. 862, 865-867. With 3 text figs. [44 refs.]

MONTEIRO (J. Lemos). Typho exanthematico de S. Paulo. IX. "Rickettsioses" e seu conceito pluralista.—*Brasil-Medico.* 1932. Apr. 16. Vol. 46. No. 16. pp. 361-362.

PECORI (Giuseppe). Febbre esantemica, febbre bottonosa o tifi benigni aberranti?—*Policlinico.* Sez. Prat. 1932. Aug. 29. Vol. 39. No. 35. pp. 1353-1357.

REITANO (Ugo) & BONCINELLI (Umberto). Ricerche sulla cosiddetta "febbre esantematica mediterranea." Nota preventiva.—*Policlinico.* Sez. Prat. 1932. Sept. 5. Vol. 39. No. 36. pp. 1389-1393.

DENGUE.

HOLT (R. L.) & KINTNER (J. H.). **Notes on Dengue.**—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 593-599. With 2 text figs. [1 ref.]

—, FLEMING (Wm. D.) & KINTNER (J. H.). **Resistance of Dengue Virus.** *Ibid.* pp. 601-609. With 4 charts in text. [2 refs.]

It has been shown both by epidemiological study and by experimental inoculation that an attack of dengue confers an immunity which lasts at least 12 months. But the authors observed recently the case of a lady, the wife of an officer, who had 3 typical attacks in 7 months ; and one of their volunteers, on whom batches of infective mosquitoes had been fed without effect, and who was sent to another station about 30

miles away, after 35 days contracted dengue. To explain these discrepancies they suggest that there may be strains of virus and one person may be immune to his homologous strain but susceptible to other strains. In conflict with this theory was the fact that infected mosquitoes brought from other areas failed to infect volunteers who had previously been infected by the local strain of virus.

The authors also succeeded in infecting mosquitoes in series up to the third feeding by means of feeding on emulsions of crushed infected mosquitoes but after the third transfer the virus could not be demonstrated. The virus was also shown to be resistant to freezing as well as to the action of X rays and ultra violet rays. Infected mosquitoes were exposed to the rays for 15 minutes.

D. Harvey.

CARRION'S DISEASE.

KIKUTH (Walter). Experimentelle Untersuchungen über Oroyafieber und Verruga peruviana. [**Experiments on Oroya Fever and Verruga Peruana.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 73. No. 1/2. pp. 1-14. [7 refs.]

The author refers to the work of NOGUCHI on *Bartonella bacilliformis* which proved that this germ was the cause of Oroya fever and that verruga peruviana and Oroya fever were different manifestations of the same disease. He also refers to the work of MAYER and himself done about the same time on a case of verruga peruviana admitted to the Tropical Institute in Hamburg. An emulsion of an excised papule injected into monkeys produced typical lesions and Bartonella were observed in the blood of one of the infected animals; two of the injected monkeys died of Oroya fever.

The present paper deals with research carried out with a culture of Bartonella received from NOGUCHI's laboratory in New York after the Japanese scientist's lamented death. The author succeeded in keeping the culture going in series by subculture on Noguchi's medium after incubation for 3 or 4 days at 30°C. and then kept on ice for two weeks without any loss of virulence. The Bartonella in culture resembled *Rickettsia prowazeki* in appearance but they showed true motility. The germs could not be passed through the ordinary bacterial filter although they were undoubtedly smaller than any of the ordinary bacteria such as Brucella. Positive cultures were obtained both from the papules in monkeys and from the peripheral blood of the infected animals. As long as the papule remains the Bartonella can be found in the peripheral blood; the verruga papule is the reservoir of the Bartonella; even in the mildest cases of verruga there is a septicaemia. But in none of the animals injected with cultures did Oroya fever develop, possibly because the culture had lost virulence as regards Oroya fever but retained its virulence for verruga papule indefinitely. Removal of the spleen previous to injection of monkeys did not enhance the virulence of the germ nor was fever or anaemia produced. The incubation period of experimental verruga in monkeys was from 9-20 days. It was also shown that after an animal had recovered from the papule it was immune to further inoculation. The author attempted to infect other animals such as dogs, guineapigs and hamsters, but failed even if the spleen was removed before inoculation.

D. Harvey.

ARCE (Julian). Verrue péruvienne ou maladie de Carrion. [**Carrion's Disease.**]—*Rev. Sud.-Américaine de Méd. et de Chirurg.* Paris. 1931. Oct. Vol. 2. No. 10. pp. 1017–1034. With 7 text figs.

This paper, written a few weeks before the regretted death of the author, gives a very full and detailed account of the clinical picture of cases of the disease and is fully illustrated by excellent photographs. *D. H.*

MALDONADO (A.). Rôle probable de quelques plantes caractéristiques de la région verruqueuse sur l'étiologie de la verruga du Pérou.—*Bull. Soc. Path. Exot.* 1931. Jan. 14. Vol. 24. No. 1. pp. 27–28.

HEAT STROKE.

CLUVER (E. H.). **An Analysis of Ninety-Two Fatal Heat-Stroke Cases on the Witwatersrand Gold Mines.**—*South African Med. Jl.* 1932. Jan. 9. Vol. 6. No. 1. pp. 19-22.

Of the 200,000 native labourers working on the Witwatersrand Goldfields, over 180,000 are employed on mines of a vertical depth exceeding 2,500 feet. The maximum depth at which work is at present being carried on is 7,640 feet. The increase in temperature on penetrating the earth's crust in these workings is remarkably low, being 1°F. for every 200 to 220 feet. [In Great Britain the increase is usually about 1°F. for every 60 to 70 feet.] The temperature of the virgin rock at a depth of 7,500 feet is found to be 99°F. Therefore it is impossible, without some form of artificial refrigeration underground, to attain atmospheric temperatures more than a few degrees below the rock temperature. These would not be excessive if it were not for the water which is used copiously as a preventative of silicosis, and in consequence there is seldom more than a degree or two of difference between the dry bulb and wet bulb thermometer readings.

The tribal distribution of the fatal cases indicates a greater susceptibility on the part of natives born and reared in cold dry areas. The author emphasizes the extreme importance of temporary acclimatization acquired in a gradual introduction to the unfavourable conditions underground, and points out that the great majority (81) of the fatalities occurred in men during the first four shifts which they worked in a hot area underground.

W. P. MacArthur.

FRIEND (Norman B.). **The Geographical Distribution and Meteorological Aspect of Hyperpyrexial Heat-Stroke.**—*Med. Jl. Australia.* 1932. Feb. 13. 19th Year. Vol. 1. No. 7. pp. 232-235. With 1 chart in text.

Since the Workers' Compensation Act (New South Wales) was passed, various claims have arisen regarding illness attributed to the effects of heat during open-air work. From a study of the meteorological conditions of Australia, and the clinical records of the Sydney hospitals, the author concludes that the summer weather usual in New South Wales is unfavourable to the production of hyperpyrexial heatstroke, but that both heat exhaustion and heat cramps may occur. The climatic conditions during the summer months in northern Queensland, the Northern Territory, and the northern portion of Western Australia are such as would give rise to hyperpyrexial heatstroke, though less intense than the type of the disease encountered in parts of Asia.

W. P. M.

SHATTUCK (George Cheever) & HILFERTY (Margaret M.). **Sunstroke and Allied Conditions in the United States.**—*Amer. Jl. Trop. Med.* 1932. May. Vol. 12. No. 3. pp. 223-245. With 4 maps & 11 figs.

The irregular distribution of heatstroke and allied conditions in different tropical countries and also in the temperate zone is a curious anomaly. In the hope of promoting understanding of this matter the authors have undertaken an analysis of the deaths officially reported as due to heat in the United States Registration Area during the years

1900-1928. The mortality rate per 100,000 varies from 0.3 in 1920 to 12.8 in 1901. Although there is much variation from year to year, a downward trend sufficiently marked to be statistically significant is apparent, this decline affecting the urban rate more than the rural. The death rates by ages are relatively high during the first year of life, and very low thereafter up to the age of twenty. Then there is a gradual rise to the age of seventy, at which point the rates rise sharply.

The records which have been most extensively studied are those for Massachusetts. Here the specific death rates for ages below twenty and above seventy are about the same for both sexes. But between twenty and seventy, the rates are about three times as high for males as for females, suggesting a correlation with occupation during the most active years of life. Also the percentage of male deaths during the past fifty years shows a marked downward trend, apparently due to the increasing employment of women in industry.

It is interesting to learn that the death rate from heat effects in States having a large coloured population is 2.4 times as high for the coloured as for the white, which again suggests a correlation with occupation.

The authors conclude that a large proportion of the deaths from heat in the United States are due to industrial conditions.

W. P. M.

HEARNE (K. G.). **Hyperpyrexial Heatstroke : a Mesopotamian Experience, with Some Aetiological Views and a Method of Prevention resulting therefrom.**—*Med. Jl. Australia*. 1932. Feb. 13. 19th Year. Vol. 1. No. 7. pp. 226-232.

This paper is based on a study of some 240 cases of true hyperpyrexial heatstroke treated by the author while serving with the British Expeditionary Force in Mesopotamia from 1916-1918. He believes that the essential cause of heatstroke is suppression of perspiration, a premonitory sign which he found to be invariably present for a time varying from one hour to forty-eight hours prior to the attack, and he stresses the importance of watching for this most reliable warning sign. During heat waves he adopted preventive measures in his own wards which proved remarkably effective. The patients were warned to report immediately any stoppage of sweating or frequency of micturition. In addition, regular inspections (hourly on the hottest days) of all patients were carried out either by the author himself or by trained assistants in order to detect any who might develop suppression of perspiration while asleep. A mere touch on the chest or abdomen was sufficient to recognize the typically hot dry skin of oncoming heatstroke. All patients in this incipient state were stripped and covered with a sheet sprayed with just sufficient ice water to keep it moist without damaging the mattress, evaporation being assisted by overhead punkas or portable electric fans. In such conditions, the author found heatstroke to be preventable with absolute certainty.

W. P. M.

REDMOND (J. Johnstone). **Venesection in Heat-Stroke.** [Correspondence.]—*Lancet*. 1932. Feb. 20. p. 425.

The author writes :—

"When passing through the Red Sea I was called to see a steerage passenger. I found a stout, middle-aged Irish woman with consciousness

completely lost, flushed face, skin very dry and hot, stertorous breathing—temperature between 108° and 109°F. I tried every remedy I knew of and found recommended, but it was all in vain, so at last I decided to try venesection and truly the result was wonderful. Within a short time the patient was conscious and next day the temperature was nearly normal."

[Was a wet sheet one of the remedies tried?]

A. G. B.

WILLOUGHBY (Hugh) & ASLETT (Edward). "**Heat Stroke.**"—*Jl. Roy. Nav. Med. Serv.* 1932. Jan. Vol. 18. No. 1. pp. 34-39.

This is a general paper describing and differentiating (in a useful table) the various types classed under "Heat Stroke." Treatment is also discussed but the paper contains nothing new.

J. H. Tull Walsh.

MISCELLANEOUS.

- i. LAQUIÈZE (E.). Les Iles Loyauté. Etude démographique. [**Vital Statistics of the Loyalty Isles.**—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 431-436.
- ii. ——. Les Iles de la Loyauté : pathologie, urbanisme et situation économique.—*Ibid.* June 8. Vol. 25. No. 6. pp. 585-589.

i. These coral islands, consisting of Mare, Lifou and Ouvea, lie to the east of and about 60 miles distant from New Caledonia. Their area is about 800 square miles. They are populated by Polynesians, whereas the people of New Caledonia are Melanesian. The last complete report of the group was made in 1911-12. Lifou, the largest, was found to contain 6,150 people, but detection of errors in the census reduced this figure to 5,859. Mare has 3,160 inhabitants and Ouvea 1,999 : Ouvea contains two races, one indigenous, the other from an island of the same name in the Wallis group, an invasion of the 18th century. The total population is thus 11,018. Since 1869 there appears to have been a gradual loss : thus—1869, 13,000 ; 1891, 12,000 ; 1898, 11,413 ; 1911, 11,173 ; 1931, 11,018. The possible causes are briefly discussed, but nothing of moment emerges. Nothing is said about loss by emigration. In the year 1931 the births exceeded the deaths in each island.

ii. The diseases met with in each island are named.

Lifou—yaws common. Some cases of tuberculosis. No malaria.

Mare—yaws very common : 5 cases of juxta-articular nodules. A few cases of syphilis [without detail] ; tuberculosis in various forms ; 14 cases of elephantiasis. Ouvea—14 cases of elephantiasis ; 3 J.A.N. Yaws in children, one case of goundou. No sign of malaria. Mosquitoes are numerous ; the genus is not stated. [Nothing is said of filaria and a medical officer is quoted to the effect that insect-transmitted diseases are absent.] Leprosy is dealt with in another paper.

A. G. B.

PLACIDI (Th.). La médecine et l'hygiène aux Nouvelles-Hébrides. [**Medicine and Hygiene in the New Hebrides.**—*Rev. Méd. et Hyg. Trop.* 1932. May-June & July-Aug. Vol. 24. Nos. 3 & 4. pp. 113-132 ; 183-208. With 11 figs. & 1 map.

The author in a long and interesting paper discusses the geography of this group of islands, the geology, flora and fauna, climate and population ; the conditions of life are described both in the free state and on the plantations where a number of Annamese are employed ; a brief account of the medical services follows. The depopulation of these islands is discussed but without adding anything to BUXTON's article (1926), an abridged form of whose table is reproduced. The reader will find little about the British share in this "Condominium." A. G. B.

PORTER (F. E.). **Health Conditions in Guam. Report of the Department of Health for the Fiscal Year 1931.**—*U.S. Nav. Med. Bull.* 1932. July. Vol. 30. No. 3. pp. 446-453.

The island of Guam, in the Marianne group, a U.S. naval station, has an area of 210 square miles and a population of 18,620 (1929). There are 9 medical officers, 9 Navy nurses, 1 dentist, 2 chief pharma-

cists, 45 Hospital Corps men and 21 native nurses on duty in the island. The tuberculosis hospital had 11 inmates at the end of the year ; it appears that many patients do not avail themselves of it. Ten lepers from Guam have been transferred to Culion, P.I., and four inactive cases are under supervision in the island. Ascariasis in children under school age " continues to be a large factor in the mortality table." Hookworm is increasing, efforts are being made to locate and treat it and a campaign of education is carried on. Yaws is prevalent but easily controlled by treatment ; there were 300 cases of yaws and 298 of gangosa under observation [? active cases]. Schools are visited twice a year and anthelmintic treatment given. Sixty-five native nurses have graduated at the training school and ten have not yet completed the course ; they fulfil an important mission among women and children. The chief causes of deaths in Agana hospital were—pneumonia 17, tuberculosis 13, dysentery [undefined] 12, gastro-enteritis 9, ascariasis 4.

A. G. B.

NEW GUINEA, TERRITORY OF. Report to the Council of the League of Nations on the Administration of the Territory of New Guinea from 1st July, 1929, to 30th June, 1930. 146 pp. 1931. Canberra.—[Part VII.—Public Health. pp. 31–52.¹

There were 15 medical officers in the Territory in June 1930, of whom one was a missionary and 3 were in private practice. The total expenditure on medical and sanitary services was £71,408, representing about 20 per cent. of the total revenue. Owing to the high infant mortality it is contemplated to form a chain of infant welfare centres ; the first is to be staffed by two European nurses, well trained in infant welfare work as well as in general nursing ; they will have to speak the native dialect ; their duties are laid down. There were admitted to hospital as in-patients 345 Europeans, 35 Asiatics, and 7,742 natives of whom as 46.3 per cent. were indentured labourers. The chief causes of native morbidity were tropical ulcer, yaws, pneumonia, leprosy, infantile paralysis, tuberculosis ; pneumonia, dysentery and tuberculosis were the causes of 174 deaths out of a total of 314. The training of natives as medical " tul tuls " was continued, raising the number from 2,495 to 2,750. Supplies were issued free of charge to Missions for medical work.

At Rabaul the most frequent cause of hospital admission (? Europeans) was malaria ; among natives the top places were occupied by tropical ulcer and pneumonia. Anophelines occur in Rabaul as a seasonal invasion between December and May : they are brought into the town by wind and find suitable breeding places there. Of 4,815 specimens of mosquito larvae only 16 were anophelines (*A. punctulatus* var. *mollucensis*) [elsewhere 4,815 breeding foci are mentioned]. Ten specially trained natives were engaged in mosquito prevention under an Asiatic overseer. Paris green proved an effective larvicide.

" It is interesting to note that since Paris Green was substituted for oiling in the treatment of water pools on the foreshores of the town, the pools, previously devoid of life, have become the habitat of a small indigenous fish that proved to be larvivorous under experimental conditions, without positive identification. This fish is believed to be the fry of a marine species."

The night blood of 242 natives was examined between 9 and 10 p.m., and of 148 of these between 9 and 10 a.m. next day. Of the nocturnal

bloods 45 or 18.5 per cent. showed microfilariae and of the 148, 29 showed microfilariae in the night blood and 8 of these embryos also in the day blood.

A. G. B.

BALDWIN (A. H.). **An Account of a Medical Survey of Norfolk Island, directed Primarily to the Question of Hookworm Disease, but also including a Series of von Pirquet Tests.**—*Med. Jl. Australia*. 1932. Apr. 16. 19th Year. Vol. 1. No. 16. pp. 543-548. With 5 text figs.

The varied history of Norfolk Island is sketched.* Its park-like surface without undergrowth is figured. Its inhabitants all live isolated on small farms and holdings of a few acres with separate water supplies from roof tanks or wells. Its volcanic fertile soil is very deep and in it deep pit latrines are dug. Its climate is perhaps the mildest in the world, with an average rainfall of 50 inches and grass is rarely parched. 143 persons were examined by Willis's technique for hookworm infection but none was found though infected persons frequently visit the island; 67 were examined for malaria parasites and 80 for microfilariae, but none were found. *Culex quinquefasciatus* lived in nearly every room examined. *Ae. aegypti* was not discovered. Von Pirquet tests suggest the absence of bovine and presence of familial human tuberculosis. For faecal protozoa 116 were examined by wet eosin and wet iodine staining. The findings were *Ent. coli* (vegetative) 2, cysts 6, both 1; giardia cysts 12, *Trichomonas hominis* 1, *Endolimax nana* 1, ciliata probably from soil 1.

Clayton Lane.

GAIDE & MARQUAND. Note sur la situation épidémiologique de l'Indochine en 1931. [**The Epidemiological Situation of Indo-China in 1931.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1932. Apr. Vol. 10. No. 3. pp. 328-346. With 7 graphs.

The diseases considered here are variola, cholera, plague, typhoid, cerebrospinal meningitis and, shortly, measles and diphtheria. Graphs for the first four show the monthly incidence for 1930 and 31, and the yearly incidence for 10 years. With the exception of a small rise in 1930 plague has since 1922 steadily decreased. The mainland of Annam was quite free in 1931, but 44 cases occurred early in the year in the small island of Poulo-Cecir-de-Mer, 60 miles from the mainland, and the disease reappeared at the end of the year. This annual recurrence, noted for several years, is a real danger for Annam, for at this season the islanders visit the mainland for work and the markets. Periodic vaccination is thought to be the best course. It may be noted that there were 2,055 cases of variola in Indo-China in this year with 527 deaths.

A. G. B.

CALCUTTA. **Annual Report of the Calcutta School of Tropical Medicine, Institute of Hygiene and the Carmichael Hospital for Tropical Diseases 1931** [ACTON (H. W.), Director].—139 pp. With 3 figs., 2 charts & 1 plate. 1932. Calcutta: Bengal Govt. Press.

This consists, as usual, of the Report of the Director of the Calcutta School of Tropical Medicine and a series of reports from the Professors

*Norfolk Island is 930 miles from Sydney, has an area of 8,528 acres and 940 inhabitants (descendants of the mutineers of the *Bounty*).

and Heads of Departments. The Director has some interesting observations to make on a visit he paid to Imphal in Manipur State, and the Naga country. This aboriginal people living in a mountainous district is cut off from civilization and forms an endemic focus for relapsing fever, Naga sore [see this *Bulletin*, Vol. 26, p. 686] and infective granuloma. Here relapsing fever is spread probably by ticks, and when the disease extends to the plains it is louse-borne. "In India . . . relapsing fever is nearly always associated with the proximity of hills and an aboriginal population." The Nagas never use milk as food; they drink a weak beer: and this is regarded as the main cause why cholera does not spread from India into Burma. Near Imphal *Fasciolopsis buski* infestation is fairly common; pigs are kept; the infestation of man is attributed to certain fish which are smoked and the flesh eaten raw and not to the water chestnut.

The Director has also something to say about that subject of perennial interest, blackwater fever. He finds three factors always associated with the disease: (1) an aboriginal population living within a quarter of a mile radius of (2) a civilized non-immune population, (3) a carrying Anopheles of the *funestus* group. The aboriginals never suffer from blackwater. The theory that any one species of Plasmodium is implicated is untenable. He refers to the monkey malaria which has been transmitted to man and to the haemoglobinuria induced by it in one species of monkey [*ante*, p. 701]. A practical application in the field would be the removal of the aboriginals from the civilized people.

Questions about malaria which called for investigation were—What degree of humidity and temperature—best expressed by the wet bulb temperature—is required to allow fertilization of the malarial parasite to take place in the mosquito, and does any subsequent alteration of temperature make any difference to the maturing of the parasites? Work by STRICKLAND and ROY seems to show that there is an optimum temperature for flagellation and fertilization of the malarial parasites and that a low temperature is necessary for the oocysts to reach full maturity. Thus during the monsoon the parasites rarely develop into sporozoites but in the cold weather they were found to have done so. To study this problem an incubator has been devised and is here described and figured. As is pointed out, if it can be shown that transmission is only possible between certain limits of atmospheric humidity and temperature all anti-larval and anti-mosquito measures could be concentrated into such periods with an immense saving of labour and material.

A commencement is being made of the study of respiratory diseases, which are responsible for nearly one-third of the deaths in the Indian army and jails, a much higher rate than in the British Army in India.

The All-India Institute of Hygiene built with funds supplied by the Rockefeller Foundation is now complete. There were to have been six sections dealing respectively with public health administration, epidemiology and vital statistics, maternity and child welfare, sanitary engineering, malariology and rural hygiene, biochemistry and nutrition, but the 3½ lakhs for the running of the Institute has been reduced to 2 lakhs, and the apportionment is still undecided. There is much else of interest in this full report. [For review of the 1930 report see this *Bulletin*, Vol. 28, p. 778.]

A. G. B.

KING INSTITUTE OF PREVENTIVE MEDICINE, GUINDY. Report for the Year ending 30th September 1931 [KING (H. H.)] & Report of the Public Analyst to the Government of Madras [HAWLEY (Herbert)].
—pp. 39+2. 1932. Madras. [8 annas].

Vaccine lymph is one of the main products of the Institute. It is now issued in a dilution of 1 in 7 instead of 1 in 5, which has been rendered possible by the attainment of an increase in potency. That increase has resulted from the introduction of an additional buffalo calf in the ordinary sequence of animals—ox calf to rabbit, to buffalo calf to ox calf—used for the production of seed lymph. The average yield of issue-lymph obtained with this seed-lymph per calf was raised from 23·8 gm. to 26·2 gm., so that only 844 calves were used as against an average for the previous 3 years of 1,112. Plague investigation has shown that *X. cheopis* is the most efficient flea vector in nature, whereas in the Presidency of Madras *X. astia* is the commoner species. Moreover "*X. astia*, though it can carry plague does so very poorly and does not appear to carry plague infection over from one season to another, for when *X. astia* alone was present epizootics have not carried over in the off season." The public analyst's report is largely occupied with data relating to the extensive adulteration of food.

W. F. Harvey.

SUDAN. Report on Medical and Health Work in the Sudan for the Year 1931 [ATKEY (O. F. H.), Director].—97 pp. With 1 folding map. 1932. Khartoum.

Under the heading, General Health of the Sudan, it is noted that the epidemic of smallpox which had swept Darfur for three years came to an end and the comment is made, "The havoc wrought in this recently occupied province by successive epidemics of relapsing fever and smallpox, in the absence of an organized medical service, is a sufficient demonstration of the need for an adequate medical organization even among primitive people and, in particular, in border provinces." The health of British officials showed a slight deterioration: the average number of days lost per official was 2·46 (1·7 in 1930); in a force of 930 there were 8 deaths and 5 invalidings. A table giving the number of days lost through sickness in the various provinces for British, Sudanese and Egyptians respectively shows that the Upper Nile and Bahr-el-Ghazal are the most unhealthy for British officials.

Epidemic Diseases—Cerebrospinal meningitis. A total of 348 (865) cases with 240 (665) deaths, a large decrease. In Mongalla province this disease was epidemic in 1918–22, almost absent in the next 4 years, and again epidemic in 1927–30. The factor which favours this epidemicity is believed to be the low standard of housing. In Khartoum and Omdurman in 5 months there were 224 cases all among Sudanese, with 159 deaths.

Diphtheria. 183 cases as against 68 in 1930; the disease is endemic in Khartoum and Omdurman (85 cases) and in Halfa District; in one village in this district 32 deaths occurred.

Relapsing fever. Epidemics recorded in the last report in Blue Nile and Khartoum provinces were continued and two outbreaks occurred in Darfur province starting in immigrants from French territory. The account of the Blue Nile epidemic has several points of interest. 386 cases occurred in the last five months of 1930, and 492 up to June, 1931, when it ceased abruptly. The case fatality was 11·9 and 13·4 per

cent. ; 5 per cent. of cases were natives of the Gezirah, a completely unimmune population though they are mostly lousy ; it is concluded that the virulence has greatly diminished since 1926. Several contacts whose blood was examined showed spirochaetes but no clinical signs of the disease. Of all the patients only 35 per cent. gave positive blood films at any time of their illness. Besides the ordinary measures to restrict spread all contacts left in the field were given grey oil intramuscularly and marked characteristically on the finger nail with silver nitrate. Since only one out of 200 so marked was afterwards admitted to hospital 281 contacts were placed under close observation in four groups receiving tartar emetic, novarsenobillon, grey oil (1.0 cc.) and nothing at all, respectively. The incidence in the grey oil group was least, 8.3 per cent. against 10.2 in the controls and it is thought that, if this result is confirmed, the use of grey oil may prove a valuable measure of control. Trial seemed also to suggest its value in treatment.

Smallpox. 218 cases as against 2,179 in 1930.

Endemic Diseases—Ankylostomiasis. Out of 760 routine examinations in Dongola hospital 46 cases were found ; no evidence of infection in the irrigated area of the Gezirah.

Schistosomiasis. In the Blue Nile province (irrigated area) the position is causing serious anxiety. The infection rate among local natives has risen from 0.2 per cent. in 1930 to 0.75 per cent. in 1931 and the number of locally infected children—a surer indication—from 20 to 51. Of 116 infected cases 56 had been examined in the previous year and of these 40 had been found free ; they had therefore contracted the disease in the interval. Of the immigrant population from Nigeria and French territory 5.6 per cent. were found infected. Snail destruction was advisedly limited to canals in the endemic areas. Treatment with molluscicide in May and July destroyed the snails which reappeared in November. Children then found infected were assumed to have been so before the operations started. In 1932 all the canals in the endemic areas are to be treated twice and in the case of some 3 times. The most difficult problem is the control of immigrants of western origin. In spite of quarantine many infected persons penetrate into the irrigated area. In December 1931 there were 346 infected westerners ; they are ignorant people who will not obey regulations.

The importance is realized of a proper lay-out of villages and the installation of bore-hole latrines in the yards of every house, but these measures must await the return of prosperity.

In Dongola province the infection is dealt with largely by examination and treatment, which are voluntary. The infection rate from 1928 to 1931 was 18 per cent., 12, 9.3, and 4.6 per cent. This diminution is important because the Dongolawi travels all over the Sudan and works extensively in the Gezirah irrigated area. In the White Nile province the disease is almost entirely rectal ; infection is by *Planorbis boissyi*, on the shallow foreshore of the river, only found from March to June ; here the digging of wells is a good preventive.

Blackwater fever. 43 cases with 20 deaths, 20 and 6 in 1930 ; 29 of the 43 were natives of the northern Sudan and 26 of the 43 occurred south of the 12th parallel.

Dysentery. A total of 2,209 cases. In 1931 amoebic dysentery caused 3.28 per cent. of hospital admissions and bacillary 0.41 ; bacillary dysentery is essentially a disease of the towns.

Guineaworm. A serious cause of disablement in the southern Sudan. A total of 588 cases.

Kala azar. There are 3 recognized endemic areas, all near the Abyssinian border; cases were 84 (56), 48 from a newly occupied area in the south-east of Mongalla province; 28 were among natives of endemic areas, 56 among persons born and bred outside these areas. Of a patrol of 74 soldiers, police and carriers who visited the Kenya border, 20 were found on their return to have kala azar.

"It would seem that Kala-Azar is endemic in the foot-hills and plains along the whole Sudan-Abyssinian border. Immigrants, whether Abyssinians from the plateau or Sudanese from the plains, are more susceptible to the disease than the local inhabitants. There are definite localised foci of the disease in certain areas and these may be so unhealthy as to be known to, and avoided by, the local natives. Despite the fact that an area may have been thus uninhabited for many years, cases immediately occur if it is reoccupied. It seems that an alternative host to man carries on the infection in his absence."

Leprosy. A list of leprosy cases is given by provinces. The largest number is 4,000 from the southern Bahr-el-Ghazal. The incidence in the northern and central provinces is very low, between the 12th and 6th parallels it becomes heavier and south of the 6th parallel it increases again, especially as the divide between the Congo and Nile watersheds is approached. Four districts are cited in evidence where the percentage of lepers lies between 0.63 and 2.4 (Tembura and Yambio). These heavily infected tribes are living in a country which owing to the heavy *Glossina morsitans* infestation are entirely devoid of cattle, and eggs are very scarce. A number of tables are given of the types of cases, infection of relatives, fertility and infant mortality.

The Medical Inspector in charge of three camps says that a large proportion of early cutaneous cases remains stationary and requires neither treatment nor segregation. They should not be brought into a Leprosy settlement unless they become "open" cases. Strict segregation of highly infective cases should be extended. Measures for the improvement of living conditions and especially of the food are more important than drugs. Bush dispensaries manned by trained native staff should be developed to deal with leprosy on the spot. Up to date in the south some 70 per cent. of the lepers have been admitted to the large settlements or camps and 40 per cent. have been repatriated.

Malaria. There were no serious epidemic outbreaks. Figures are given, with reservations, of the incidence of the three types of malaria. The prevailing type in the country districts is believed to be benign tertian, and in the neighbourhood of the towns and government stations malignant tertian; quartan is relatively rare.

Undulant fever.* 25 cases reported, 21 of which were from the Blue Nile and Kassala provinces.

Rabies. 18 cases of canine rabies and 3 of hydrophobia. Rabies was unknown before 1924 and has now spread all over the country except to Dongola and Halfa provinces. Every effort is made to destroy surplus dogs.

Sleeping sickness. In the Bahr-el-Ghazal province 61 (37) new cases were found, all in an area abutting on French Congo. The cause of the retrogression is explained and measures are being taken to reduce the infection. Trypanamide has been the routine treatment. Since 1918 a total of 3,746 cases has been treated and 47 per cent. are still

*The term Malta fever is used.

living. The average life of treated patients is 8 years 1 month. No cases were detected in Mongalla province in spite of its proximity to infected areas in Uganda and the Belgian Congo.

Syphilis. The incidence is steadily decreasing. The natives come readily for novarsenobillon but as a rule do not remain for more than one or two injections.

Tuberculosis. A total of 684 cases was admitted to hospital, 593 contracted in the Sudan; 390 were pulmonary. A table of the percentage incidence relative to total hospital admissions goes to show that no increase of pulmonary tuberculosis is taking place in the Sudan as a whole. A careful survey of the Nilotic Negroid tribes of the Upper Nile Province discovered 39 cases in 181,000 persons, an infection rate of 0.2 per 1,000. The majority of these tribesmen have been little in contact with the outside world; it is hoped to keep their tribal organization intact and thus mitigate or defer their exposure to the infection. In the Bahr-el-Ghazal the tribes most heavily infected with leprosy are those least tuberculized. Tables are given of tuberculin (Mantoux) tests.

Enteric fevers. A total of 100 cases of typhoid and paratyphoid; 73 in 1930.

Yaws is widespread through the Southern Sudan beyond the 10th parallel. A striking decrease in the last few years is attributed to treatment, though incomplete, with novarsenobillon, "a prophylactic agent of the greatest value."

In the report on the health of Khartoum province there is matter of interest about bore-hole latrines. The 26 that were sunk at first gave satisfactory results; later it was found that an excessive number of persons was using them. It was therefore decided to sink bores for every house. Commencing on October 7 with 2 teams of 6 prisoners each, by the end of the year 145 were sunk or about 12 per week. Each bore is sunk to a depth of 7 metres. In Omdurman it was found that the auger would not penetrate owing to the hardness of the soil and ordinary pit latrines had to be dug.

Vital statistics of Khartoum Province—population 277,752; births 5,144 or 18.5 per mille, deaths 2,862, or 10.3 per mille, infant mortality 60.8 (49 in Khartoum, 86 in Omdurman).

The report deals also with the health of Port Sudan where the chief sanitary problems are the limitation of fly breeding and the disposal of sewage; with medical surveys of Nilotic Negroids of Upper Nile Province, which are sketchy; with the medical work carried out by Missions, three of which have in all five doctors; with vital statistics, medical examination of schools, quarantine at Wadi-Halfa, Port Sudan and the Suakim pilgrim quarantine, and training (medical, midwifery and nursing).

A. G. B.

VAN PATOT (P. N. Tissot). Vergelijkend overzicht van den gezondheidstoestand in het Nederl.-Indische Leger over 1930 en de laatste tien tot vijftientig voorafgaande jaren. [*Hygiene in the Army of the Netherlands Indies for 1930 and for 10 to 25 Years previously.*—*Bijblad o. h. Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June. Bijblad 3. pp. 125-175 (5-55). With 31 graphs.

The morbidity of the European is always on a higher scale than that of the non-European and for 1930 this was in the proportion 70.9 per cent. to 43.7 per cent., or for the combined groups, 49.5 per cent.

This may be compared with the combined figure, 58·6 per cent. in 1928, for the army in British India. Highest among all diseases affecting Europeans (20 per cent.) are the venereal diseases, whereas the highest among non-Europeans is malaria (10·1 per cent.). A table and graph show the typhoid fever morbidity from 1905 with its percentages in that year of 17·9 and 6·9 among Europeans and non-Europeans respectively to 1930 in which year these had fallen to 1·5 and 0·7. It was in 1915 that general vaccination for this disease was introduced and from 1915 that the fall has been striking and continuous. Malaria provides equally interesting figures. Here the morbidity was 72 per cent. in 1898 but had diminished to 7 per cent. in 1922. It was also 7 per cent. in 1930. No cholera cases have occurred in the army since 1920. Statistics of the dysenteries are somewhat difficult to interpret and are presented under the three denominations amoebic dysentery, bacillary dysentery and enteritis. Fluctuations of the curves of these diseases are considered to be due to improvement of diagnosis with subtraction of figures from one category and addition to another. The frequency curves seem almost to show the effects of the discovery of the cycle of the pathogenic amoebae, the introduction of a modern therapy with the drugs emetine, yatren and stovarsol, and the first isolation of the dysentery bacilli. Good results obtained elsewhere with vaccination against bacillary dysentery led to the addition of a dysentery component to the usual typho-cholera vaccine. Most striking of all the tables given, and illustrating a great advance in preventive medicine, are those relating to beriberi. The morbidity from this disease among non-Europeans—to take a few instances—was 30·6 per cent. in 1887, 1·5 per cent. in 1907, 0·16 per cent. in 1924 and 0·016 per cent. in 1930. Various other diseases receive consideration but one further reference will suffice. Tropical sprue practically does not occur in the army among non-Europeans. Some cases, however, occur among the Europeans every year. W. F. H.

SEQUEIRA (James H.). **The Educational Aspect of Public Health Work in the Tropics (with Special Reference to Kenya).**—*East African Med. J.* formerly *Kenya & East African Med. J.* 1932. June. Vol. 9. No. 3. pp. 59–78. [14 refs.]

This was a Chadwick public lecture given in London in April, 1932. The author, who was formerly a London consultant, has been nearly five years resident in Kenya. The address contains little that is unfamiliar to readers of this *Bulletin* but the lecturer viewed his subject from a wider angle than usual. He gives evidence of the general ill-health from which the native suffers, instancing malaria, worm infestations, yaws, tropical ulcer, venereal disease. Here he agrees with other observers that syphilis on the whole is mild and is rarely followed by disease of the heart and great vessels: tabes and general paralysis are extremely uncommon. It takes a heavy toll, however, of the unborn child. He notes that “for a long time the Masai have imposed a strict quarantine on syphilitics with a view to combating the high incidence of abortions and still-births.” This tribe, however, was unaware that the sterility of its women (estimated at 30 per cent.) and some of its men was due to gonorrhoea. The author has found surprisingly little evidence of congenital syphilis. The chief cause of the high infant mortality, in his opinion, is maternal ignorance—unsuitable food, dirt and the resulting flies.

Discussing modes of access to the native he suggests that the logical avenues are the idea of self-preservation and the strong instinct of reproduction. To the latter he attributes the increasing resort to hospitals and dispensaries; the natives have learned that the white man's medicine is able to prevent repeated abortions and still-births. He does not mention the attraction of injections for yaws. He discusses the influence of the motor car with its annihilation of distance and of the spoken word at barazas; exhibits at local shows and cinema films; housing and food. An interesting development is the "Jeanes school" founded by Government in 1925. Its function is to train visiting teachers, who are selected by the Missions. They are employed in the Reserves to improve the work of the village schools and to promote the general health and well-being. Government provides two-thirds of their salaries. The course lasts two years. The teacher comes back for a refresher course every year. A. G. B.

RAYNAL. Quelques notes médicales sur le Guatemala. [Medical Notes on Guatemala.]—*Ann. de. Méd. et de Pharm. Colon.* 1932. Jan.-Feb.-Mar. Vol. 30. No. 1. pp. 59-83. With 1 map.

The Institut Pasteur of Paris having been asked to provide a bacteriologist to organize and direct the public health laboratories of Guatemala and to teach in the Medical School, the author was selected and left France in April 1929 on a two years' mission. He here gives some account of the medical geography of the country. It can be divided into three distinct zones—the low lying zone, 600 metres and less above the sea, with a hot humid climate; a temperate zone at 600-1,800 metres altitude, where coffee, maize, rice and sugar cane are cultivated, and in which the city of Guatemala lies; the cold zone, where barley and apples are grown and sheep are raised; this runs up to 3,000 metres. The population consists almost entirely of Indian and Indo-Spanish creoles.

The last epidemic of yellow fever was in 1920-21. The disease is believed not to be endemic, but might easily be introduced again; the carrier abounds. Malaria is general and has recently extended owing to the movements of the upland population to work in the lowlands and their return to their homes. *A. pseudopunctipennis* is probably the chief vector, but there are also found *A. albimanus* and *A. argyritarsis*.

Hookworm is found to the extent of 7 per cent. in the capital, 64 per cent. in urban populations in the departments and 75 per cent. in rural; over 221,000 examinations were made by Dr. OCHOA. Leprosy exists but does not seem to be common. In the leper camp the author found that of 30 patients 8 only were clinically cases of leprosy and 5 of these were confirmed bacteriologically. He never saw a case of leprosy in his travels about the country. Leishmaniasis is almost entirely localized to the forests of the Peten province, which lies to the west of British Honduras, and increases in frequency as one goes north. It is a cutaneous form and never attacks mucous membranes. Its chief site is the pinna. Dogs with leishmanial ulcers on ears and muzzle are frequent. Nothing is recorded of its transmission, and it is assumed that phlebotomus occurs in the Peten region but not elsewhere. Smallpox has almost disappeared owing to efficient vaccination. No nervous complication of vaccination has been reported. Trypanosomiasis is unknown. Relapsing fever and dengue are not known to occur, nor has yaws come to light though it is said to exist in Mexico

and in Costa Rica. Intestinal parasites are frequent. In a total of over 221,000 examinations they occurred in the following order of frequency—ankylostomes, roundworms, trichuris, oxyuris; and tape-worms as *T. saginata*, *T. solium* and *H. nana*; flukes are unknown and schistosomiasis is absent, as elsewhere in Central America. Enteric fever is far from negligible though large epidemics are rare. Undulant and abortus fevers have not been observed.

Typhus is the most widespread contagious disease in the "altos," especially in the coldest months. It is louse transmitted; 16 of 20 cases gave a Weil-Felix reaction at a titre above 1/200, reaching 1/600 in some instances; 4 out of 5 inoculated guineapigs gave a characteristic febrile reaction. It is thus true epidemic typhus. It differs, however, from the European form in that male guineapigs get redness and oedema of the scrotum, as in Mexican typhus.

Guatemala has one disease which is special to it, the onchocerciasis described by ROBLES. It is restricted to the volcanic region on the Pacific side, in the coffee plantations at 800–1,200 metres altitude, and extends into Mexico. The microfilariae are found in the skin. The author snips off some fragments, drops them into a centrifuge tube containing 1–2 cc. of saline solution 9 per mille, shakes the tube from time to time and after a few hours centrifuges; the microfilariae, sometimes very numerous, are found in the residue.

The information about other diseases is too vague for reproduction.

A. G. B.

MAYER (Martin) & NAUCK (Ernst Georg). Von einer medizinischen Studienreise nach Transkaukasien. [**A Medical Tour in Transcaucasia.**—*Deut. Med. Woch.* 1932. Apr. 15. Vol. 58. No. 16. pp. 629–631.]

The authors, who are attached to the Hamburg Tropical Institute, went to Transcaucasia to study tropical diseases, a task which was rendered the easier for them in that the doctors in charge of tropical research were largely their old pupils. They visited Baku in Azerbaijan, Tiflis in Georgia, Sukhum in Abkhasia, Batum in Ajaristan and Erivan in Armenia, as well as other places. The diseases met with were malaria, leishmaniasis, ankylostomiasis and pellagra; of the last it is estimated that there are in West Georgia 50,000 cases. Both kala azar and oriental sore, as well as canine kala azar, are found. Ankylostomiasis is kept up among the Georgia peasants because the houses are built on piles and the children pass their excreta under the buildings; these spaces must be wired off. Measures of research and prevention of these diseases in Transcaucasia seem to be actively pursued.

A. G. B.

ANTWERP. Institut de Médecine Tropicale "Prince Leopold," 155, rue Nationale, Anvers. Statuts. Règlement organique. [**Prince Leopold Institute of Tropical Medicine.**] [In French & Flemish. 33 pp. Undated, ? 1932.]

The Belgian School of Tropical Medicine at Brussels is, it appears, to be replaced by the new foundation described in the title, situate in Antwerp. Its objects are stated to be—To create and maintain in activity a school of hygiene and tropical medicine for the training of doctors and sanitary agents in the colonies and for the study

of all problems relating to the aetiology and treatment of tropical diseases, and to establish laboratories and clinics annexed to the school. The composition of the board of management, its duties and those of the secretariat and director are here described officially. The courses are to last 15 weeks. A. G. B.

GARCIA DE COSA (Cecilia). Siete casos de infección doble por paludismo y por fiebre recurrente. [**Simultaneous Infection by Malaria and Relapsing Fever.**—*Rev. Sanidad e Hig. Pública.* 1932. Aug. Vol. 7. No. 8. pp. 678-692. With 9 charts.

The author records in detail, with charts and tabulated blood conditions, 7 cases of dual infection by malaria parasites and *Spirochaeta hispanica*. It is a well known fact that in a malarious subject almost any fever may assume a certain periodicity, and in all but one of these cases the clinical diagnosis was malaria, benign tertian in four, subtertian in two. The numbers of plasmodia and of spirochaetes are given in the tables; the latter varied from 50 to 1,450 per cmm.

The question of the possible effects of the two infections upon each other, or upon the clinical course of the fever is not considered, but might be well worth studying as the mutual antagonism of diseases is an interesting and inadequately investigated problem [this *Bulletin*, Vol. 15, p. 252].

The author remarks that the spirochaetes were usually not found until antimalaria treatment had been started and the question naturally arises "Is it the treatment for malaria which brings to the fore a relapsing fever of the inapparent form?" ; but she interprets this by saying that the patients usually come up in an apyrexial interval when the spirochaetes are no longer to be found in the peripheral blood, but the malaria parasites may be in considerable numbers. H. H. S.

SCHLOSSBERGER (H.) & MENK (W.). **Experimental Investigations of the Therapeutic Effectiveness of Gold Compounds in Spirochetal and Trypanosomic Diseases.**—Reprinted from *Jl. Chemotherapy*. 1931. July. Vol. 8. No. 2. pp. 41-56. [58 refs.]

This paper opens with a general review of the history of the use of gold compounds in the treatment of disease. In the authors' own experiments an attempt was made to establish the therapeutic effectiveness of various gold preparations in syphilis and recurrent fever and in mice infested with *T. brucei*. The various gold compounds used and their toxicity and maximum tolerated dose in mice are set forth in a table. Graphic formulae of the compounds are also given. The following is the summary:—

" 1. In mice infected with *Spirocheta crociduræ*, a race of spirochetes closely related to *Spirocheta duttoni*, maximum tolerated doses of neoarsphenamine produce total destruction of the organisms only in a part of the animals. With neosilverarsphenamine, sterilization of mice infected with *Spirocheta crociduræ* is apparently not possible.

" 2. On the other hand, single doses of some gold preparations, particularly of solganal, bring about regularly the destruction of all the spirochetes present in the animal. However, while the doses required for a complete cure are well tolerated by healthy animals, they prove toxic to animals weakened by the infection.

" 3. We tried, therefore, to obtain increased curative action by combined neoarsphenamine-solganal treatment, and we found the mixture of neoar-

sphenamine and solganal capable of sterilization of mice infected with *Spirocheta crociduræ*, in doses very well tolerated by infected animals.

" 4. At the early stage of syphilitic infection in mice, the animals can be sterilized with neoarsphenamine and neosilverarsphenamine, as well as with some gold preparations, particularly with solganal and sanocrysin.

" 5. Late in the course of syphilitic infection in the mouse, *i.e.*, after the spirochetes have penetrated into the central nervous system, arseno-benzene compounds and gold preparations do not always produce sterilization.

" 6. It seems, however, that the neoarsphenamine-solganal mixture is capable of a total annihilation of spirochetes, including those present in the brain, at this stage also.

" 7. Sulfoarea which is 4,4'-bis-(2-auromercaptobenzene-1-sulfonic acid)-urea, possesses not only spirocheticidal, but also trypanocidal properties.

" 8. A trypanosome strain (*Trypanosoma brucei*) treated with sulfoarea for a long time, proved afterwards resistant to neoarsphenamine and germanin, but not to sulfoarea."

W. Yorke.

(COLOMBO (U.). Activité de l'équipe antilarvaire de la brigade d'assainissement d'Elisabethville pendant les six premiers mois de son fonctionnement. (Février à juillet 1931.) [**Work of the Antilarval Brigade of Elisabethville in its First Six Months.**—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 113-131.

Information is given of the constitution of the brigade and its duties. In the six months it removed 28,043 empty receptacles from the town and its environs, chiefly bottles, tins and food containers. The "boys" of Europeans are chiefly responsible but responsibility is not easy to fix and the problem is rendered more difficult by the number of plots unbuilt on and houses unoccupied. In the same period 3,084 breeding places were found and destroyed; of these 17.3 per cent. harboured anopheles, 62.3 per cent. *Culex* and 20.4 per cent. *Aedes*. The breeding grounds are classified as occurring in the European town, the native town, or the intervening neutral zone with the following result:—

	Anopheles per cent.	Culex per cent.	Aedes per cent.
European town ...	35.7	54.6	88.6
Native " ...	14.2	19.3	8.2
Neutral zone ...	50.1	26.1	3.2

The *Anopheles* hatched out in the laboratory were *A. costalis* 72 per cent., *A. maculipalpis* 25.9 per cent., *A. squamosus* 1.7 per cent., *A. mauritanus* 0.1 per cent. The *Aedes* were *Ae. aegypti* 88.4 per cent., *A. simpsoni* 11.6 per cent. The *Culex* were chiefly *C. duttoni*.

The breeding grounds are then classified as natural and artificial; in the natural there were 564 collections of larvae, 32 per cent. *Anopheles*, 8.3 per cent. *Aedes*, and 59.6 per cent. *Culex*; in the artificial there were 2,520 collections, and here *Anopheles* were most numerous in the industrial breeding places, quarry pits and the like. The most frequent larval associations were *Ae. aegypti* and *C. duttoni* 47, *A. costalis* and *C. duttoni* 33, *A. costalis* and *A. maculipalpis* 34, *C.*

duttoni and *C. tigripes* 22. In his conclusions the author points to the urgency of sanitating the neutral zone, as the greatest reservoir of anopheles. A. G. B.

PALTHE (P. M. van Wulfften). Zenuwziekte in de tropen in verband met lagen bloeddruk. [**Low Blood Pressure in Conjunction with Nervous Disease in the Tropics.**—*Nederl. Tijdschr. v. Geneesk.* 1932. May 7. Vol. 76. No. 19. pp. 2186-2192.]

The author makes out a case for a definite clinical condition with a definite syndrome, which is to be found especially among those who have resided for long in the tropics. Nor is the condition at all uncommon. It is not to be put down as neurasthenia nor as an anxiety-neurosis. It has many of the symptoms associated with beriberi, but has nothing to do with that disease. The patient is ashamed of appearing before a doctor. His symptoms are variable and indefinite—extreme fatigue, tendency to childish manifestations such as proneness to tears, pains in the body and head, dizziness, fear of death, visual and auditory disturbances, sleeplessness or the contrary condition of sleepiness, nausea, vomiting and diarrhoea, sweating and others. More objective signs are a dermatographic skin reaction, palpitation, a systolic blood pressure of 95 to 100 mm. and a diastolic of 55 to 60, dilated pupil, dilated retinal artery and rose coloured papilla. Many of these are the symptoms of low blood pressure and vasomotor atony; the disease is named "essential hypotension" and is regarded as a disturbance of the equilibrium, an atony of the autonomic endocrine system. Treatment is by means of strychnine and mixed gland preparations, but not by adrenalin. Something of an avitaminosis is not altogether excluded and vitamines preparations are indicated. The use of pituitary posterior lobe preparations (vasopressine) may be of use. In the advanced cases a return to the home country may be obligatory. W. F. Harvey.

ERRATUM.

In the summary of the article on primary liver cancer in Java by Professor BONNE (*ante*, No. 7, p. 532) exactly the opposite meaning was regrettably given in the sentence:—

"As primary liver carcinoma and cirrhosis are very intimately connected, it may be that in Java alcohol is a causal factor in the production of both conditions."

This should be, in literal translation:—

"Liver cancer and cirrhosis are so constantly associated that a connexion must exist between both affections It may perhaps be noted that in Java alcohol can no more be regarded as a primary factor in the causation of liver cancer than of cirrhosis itself."

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MEDICAL ZOOLOGY.

HOARE (Cecil A.). **On Protozoal Blood Parasites collected in Uganda. With an Account of the Life Cycle of the Crocodile Haemogregarine.**—*Parasitology*. 1932. June. Vol. 24. No. 2. pp. 210–224. With 56 figs. [17 refs.]

When he was attached to the Human Trypanosomiasis Institute at Entebbe the author availed himself of every opportunity of examining the local fauna for parasitic protozoa. In this paper are to be found among other things descriptions of 7 new species of such protozoa, and a record of new hosts for a number of known species with new observations on some of them; the descriptions are bountifully illustrated (56 figures) in the text and there is a good list of references. The new species include a *Plasmodium* in the blood of *Mabuia* (skink) lizards, and one in a wheatear (*Saxicola*); a *Trypanosoma* in the blood of several species of fishes of the genus *Haplochromis*; a *Haemogregarina* in the blood of a frog of the genus *Hyperolius*, another in that of a *Simocephalus* snake, another in that of a *Boaedon* snake, and another in that of a *Crotaphopeltis* snake. Among the new observations on species of protozoa already recorded those on the life cycle of *Hepatozoon pettiti* in the Nile crocodile (*C. niloticus*) may be noticed, as the first instance where a dipterous insect (*Glossina palpalis*) has been proved the intermediate host of a haemogregarine. In the author's experience every crocodile examined in L. Victoria (from the young a month old to full-grown adults) was infected with *H. pettiti*, although the parasites always were scanty in the blood. The schizogony occurred exclusively in the crocodile's liver, the initial stages in erythrocytes, the final stages in Kupffer cells; the full-formed merozoites are quite similar to slender forms seen in the reptile's liver. The sporogony takes place in the gut of the tsetsefly and results in the formation of large spherical oocysts, each one being stuffed with many (over 100 estimated) sporocysts each of which contains a multitude of sporozoites. The crocodile is infected *per os*; when the tsetsefly settles in its mouth to feed, the irritated reptile would snap its teeth, crush the fly, and so set free the cysts of the haemogregarine in its mouth. The facts about sporogony had been observed by previous observers (CHATTON and ROUBAUD; MACFIE) but it is the present author who has established the Nile crocodile as the final host of the haemogregarine in Lake Victoria and *Glossina palpalis* as the intermediary. The haemogregarine, as the author notes, is known chiefly as parasite of leucocytes

and erythrocytes of mammals; he himself has followed it into birds also, and now into reptiles and through the intermediation of *G. palpalis*.
A. Alcock.

POINDEXTER (Hildrus A.). **Studies on the Cultivation of Parasitic Intestinal Protozoa.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. June. Vol. 7. No. 4. pp. 417-434. [72 refs.]

This is a retrospect, and an abstract of the literature, on the cultivation of intestinal amoebae and intestinal flagellates, with an appended bibliography thereto. The author's own studies in the cultivation of *E. histolytica* and of some intestinal flagellates are described in much detail, along well-beaten tracks.
A. A.

CHOPRA (R. N.) & CHOWHAN (J. S.). **Action of Venom of the Indian Dabola (*Vipera russellii* vel *Vipera elegans*) on Certain Protozoa.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 107-115.

In an earlier paper the authors showed that the venom of the Indian cobra had a strongly toxic effect on certain Protozoa, particularly on *Paramoecium caudatum*; soon after exposure to that venom the movements of the Ciliate were slowed and then completely paralyzed, and thereafter its body swelled and disintegrated; even in a dilution of 1 in 30,000 cobra venom thus killed the organism in 1 to 2 hours.

In comparison with Indian cobra venom the venom of Russell's viper has little or no effect on *Paramoecium*. The organisms were not affected by concentrations of that venom ranging from 1 in 100 to 1 in 100,000; the only change noticed was a dulling of their motility; they sank to the bottom or were driven to the periphery of the glass cell; they were not paralyzed, and they did not die even after 24 to 48 hours' exposure to the venom. Change in hydrogen-ion concentration of the substrate on the alkaline side makes the *Paramoecium* more vulnerable to Russell's viper venom, 1 in 400 concentration killing in 1 to 2 hours and 1 in 800 in 24 hours; but change on the acid side has no effect on the toxicity to this Ciliate.

The authors argue that "the action of cobra venom is more on the rudimentary neuro-motor apparatus which has been described in this organism" and that Russell's viper venom, which has a selective action on the vascular endothelial cells, can have little or no effect on a unicellular organism not possessing a vascular system.

In their experiments in other directions they found that Russell's viper venom had no effect on the helminths *Toxocara canis* and *Ancylostoma caninum* in concentrations of 1 in 1,000 and less, while in higher concentrations from 1 in 100 to 1 in 1,000 the worms appeared active at first but later were slowed and appeared to become stiff; but they did not die even after exposure for 24 hours.
A. A.

SCHILLING (Claus) & SCHRECK (Hans). Bleiben erworbene biologische Eigenschaften pathogener Protozoen bei der Passage durch die natürlichen Ueberträger erhalten? [**Are Acquired Biological Properties of Pathogenic Protozoa retained in Passage through their Natural Vectors?**]*—Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Mar. Vol. 36. No. 3. pp. 105-107.

This is a notice of criticism published by REICHENOW in the *Zentralblatt für die Gesamte Hygiene*, 1931, Vol. 25, P. 170 of the present

authors' paper (same title) which was abstracted in this *Bulletin*, Vol. 28. p. 484. In that paper these authors clearly described facts, experimentally elicited in the chosen isolation of a small coral island, from which they infer, by a sound logical method, that the virulence and reactivity to specific anti-bodies "acquired" (as they say) by an old laboratory-strain of a specific trypanosome are lost by passage through the natural insect-intermediary. [There is nothing unreasonable in this argument; Zoologists know that many characters commonly but *wrongly* classed with and called "acquired" characters are *not* hereditarily transmitted when the organism is returned to its natural environment. Where criticism of the authors lies perhaps is in their styling laboratory-enforced modifications as being "acquired"]. A. A.

TSUCHIYA (H.). **Observations on "Encystment Cycle" of *Endamoeba histolytica* in a Carrier.**—*Proc. Soc. Experim. Biol. & Med.* 1932. May. Vol. 29. No. 8. pp. 930-932.

In stools of a carrier of *E. histolytica* studied daily for 215 days a definite cycle of encystment was observed, the duration of the cycle being from 8 to 10 days. The number of cysts fluctuated from day to day, with a maximum of about 1,250,000 per gram of stool. Under favouring conditions of temperature and moisture cysts may mature *in vitro*—e.g., uni- and binuclear cysts develop to maturity quite readily *in vitro* at room temperature (22°C.) and in a refrigerator at 5°C. In a refrigerator washed cysts lived for 28 to 35 days and cysts in stool 9 to 11 days; but at room temperature the corresponding viabilities were 7 to 9 days and 3 to 6 days. No correlation was observed between consistency of stools and number of cysts. A. A.

MARCHOUX (E.) & CHORINE (V.). La fécondation des gamètes d'hématozoaires. [**The Fertilization of Gametes of Haematozoa.**]—*Ann. Inst. Pasteur.* 1932. July. Vol. 49. No. 1. pp. 75-102. With 2 figs. [23 refs.]

The authors recount the chronological and the natural history of Haemoproteus (=Halteridium) as an introduction to this experimental disquisition based on fertilization of the gametes of *H. oryzivora*; and they tabulate the following conclusions from their experiments. The fertilization of *H. oryzivora* is consummated at 13° to 43°, the optimum temperature being 36°. The oocinetes are formed at 20°-23°; they degenerate at 37°. Neither concentration of the liquid nor cooling provoke fertilization. Addition of NaCl in either very feeble or very strong solution is a preventive agent, though a 1 per cent. solution has no effect. Potassium oxalate and sodium citrate in physiological saline permit fertilization in non-coagulated blood.

It is the CO² of the blood which is the restraining agent, fertilization starts when the CO² is disengaged, provided that the action of that gas has not been too prolonged. The disengagement of CO² brings the pH of the blood from 7.38 to 7.75 in 5 minutes. The CO² only acts by maintaining a low pH of the blood; other acids have the same effect, but the injection of alkaline solutions modifies the pH of the blood but little. Fertilization is effected in the relative absence of oxygen, and in an atmosphere of hydrogen.

Hydrochloride of quinine arrests fertilization in solutions of 1 in 10,000 and almost entirely interdicts it in solutions of 1 in 1,000. Plasmoquine and 710 Fourneau also arrest in solutions of 1 in 10,000, and interdict in solutions of 1 in 4,000. A. A.

GINGRICH (Wendell). **Immunity to Superinfection and Cross-Immunity in Malarial Infections of Birds.**—*Jl. Preventive Med.* 1932. May. Vol. 6. No. 3. pp. 197–246. [34 refs.]

This is a comparative study of the acquired immunity and cross-immunity to eight strains (4 species) of malaria infection in birds (canaries). The experiments cannot be summarized; their results support and supplement the propositions that the immunity to superinfection runs concurrent with a latent or chronic infection and ceases when the infection is completely eliminated; that no demonstrable humoral antibody is associated with this acquired immunity; but that the manner of immunity to superinfection is primarily increased phagocytosis of parasitized red cells by proliferation and increased activity of macrophages, chiefly in the spleen and liver. *A. A.*

SIMIĆ (Tsh.). Etude biologique et expérimentale du *Trichomonas intestinalis*, infectant spontanément l'homme, le chat et le chien.—[**Biological and Experimental Study of *Trichomonas intestinalis* Spontaneously infecting Man, Cat and Dog.**—*Ann. Parasit. Humaine et Comparée.* 1932. May 1. Vol. 10. No. 3. pp. 209–224. [10 refs.]

Of *Trichomonas* (a) four out of five strains of human origin have infected the cat and have been pathogenous to the animal; and (b) four strains of feline origin have infected the dog; in both kinds of animals infection was set up by rectal injection, by ingestion in milk, and by contact; furthermore, four out of six persons were infected by ingestion of *Trichomonas* of feline origin and two out of three persons by ingestion of *Trichomonas* of canine origin. On these data the author decides that it is one species that infests man, dog, and cat.

All the strains of *Trichomonas*—human, canine, and feline—phagocytosed red blood corpuscles and starch; all withstood for an hour a temperature of -18° , and for 10 minutes a temperature of $+47^{\circ}$. The longevity of different strains of *Trichomonas* in water ranges from 18 to 35 hours. At Skoplie (S. Yugoslavia) more than 7 per cent. of the population is infected with *Trichomonas* and more than 30 per cent. of the young dogs. Indeed the dog may be the reservoir of human infection. *A. A.*

SIMIĆ (Tsh.). Etude complémentaire de l'infection du chien par le *Trichomonas* d'origine humaine, canine et féline. [**Infection of Dog by *Trichomonas* of Human, Canine and Feline Origin.**—*Ann. Parasit. Humaine et Comparée.* 1932. Sept. 1. Vol. 10. No. 5. pp. 402–406.

The author repeats his experimental conclusion that the cat, and even more the dog, can be infected with *Trichomonas* of human origin, and conversely that man can easily be infected with the *Trichomonas* of those animals. In the present paper, however, he records that of dogs it is only the young that can be so infected; in very young puppies the infection is intense, enduring, and fatal; in dogs of 2 and 3 months it is intense but can be cured in 25–45 days; it appears that adult dogs resist infection, whatsoever its source. *A. A.*

LYNCH (Kenneth M.). **Invasion of the Wall of the Intestine by *Trichomonas hominis*.**—*Amer. Jl. Trop. Med.* 1932. May. Vol. 12. No. 3. pp. 247–253. With 1 fig.

The patient in this case was a white woman of 47 years. On the second day after some operations (including cauterization of cervix uteri, extraction of bad teeth, and removal of some external haemorrhoids) she suddenly developed acute abdominal symptoms, violent diarrhoea with purulent stools (found to contain enormous numbers of *Trichomonas hominis* in active multiplication), and a septic fever which ended in death after 12 days. Immediately after death an autopsy was made and a gangrenous ruptured transverse colon was removed and placed in 10 per cent. formalin. Sections of a piece of this showed the mucosa necrotic and ulcerated and infiltrated with *T. hominis*, particularly in the depth of the necrotic pockets which extended into the "living" muscular coat, but not where active leucocytosis existed. "Of course, in such a case as this, of virtual gangrene of the intestine, the entrance of *Trichomonas* into the wall of the bowel would probably be of no significance in the course of events." WENYON's case is quoted (*Jl. Trop. Med & Hyg.* 1920. Vol. 23. p. 125), in which also there was not any noticeable lesion that could be attributed to an invasion of *Trichomonas*; also a case by PENTIMALLI of *Trichomonas* in the circulating blood, and one by KESSEL of *Trichomonas* in the pus of amoebic liver-abscess. A. A.

PENSO (Giuseppe). Le cisti del "*Trichomonas intestinalis*." [**Cysts of *Trichomonas intestinalis*.**]—*Ann. di Med. Nav. e Colon.* 1932. May-June. 38th Year. Vol. 1. No. 5-6. pp. 275-278. With 2 figs.

The author describes certain bodies which he observed in the faeces of a patient with large numbers of *T. intestinalis*, 10-12 in each field of the oil immersion lens. No other parasites were seen. The bodies were pear-shaped, in size 8-12 μ by 4-5 μ , with granular protoplasm, and a kidney-shaped nucleus with masses of chromatin, occupying the middle and wider part, and towards the narrower end the blepharoplast, with a flagellum bounding an undulating membrane. Running parallel to the flagellum was a thin structure which the author interprets as the remains of the axostyle; the whole he believes to be the cyst of *T. intestinalis* which has not previously been described.

H. H. S.

LIDDO (Salvatore). Osservazioni sulla resistenza nell'ambiente delle cisti di *lamblia* umana. [**The Resistance of *Lamblia* Cysts under Atmospheric Conditions.**]—*Pathologica.* 1932. Sept. 15. Vol. 24. No. 491. pp. 614-615. English summary (9 lines).

The author studied the time of survival of cysts of *Giardia lamblia* when subjected to the temperature and general conditions of his laboratory, stools containing the cysts being kept in a corner of the room, protected from direct light and at a temperature of 14°-18°C. At intervals he took samples from the surface and from the depth, determining by rough count the reduction in numbers, the presence of glycogen in them (as a criterion of vitality) and their decystment.

During the first 10 days he obtained the glycogen reaction, but the numbers were reduced 50-70 per cent. in 20 days, and 90-95 per cent.

in 40–50 days. The majority of the cysts examined, even when showing no morphological change, did not give the glycogen reaction and were, therefore, probably not viable or capable of setting up infection. Others were swollen, with non-granular protoplasm and obviously dead. Within the first 10 days he observed decystment *in vitro* in exceptional instances, and in horse serum at 37°C. Their infectivity is, consequently, probably limited to the ten days after passage.

H. H. S.

LICKINT (Fritz). Die Lambliasis, eine Bergrevierkrankheit? [**Lambliasis, a Disease of Mining Districts?**]—*Muench. Med. Woch.* 1932. June 17. Vol. 79. No. 25. pp. 993–994.

The author writing from a Department of the State Hospitals in Kuchwald-Chemnitz, states that it is difficult now to say anything new about lambliasis as a disease. Considering it, however, from the point of its incidence, he states generally that in many, including even large, clinics in Germany its clinical picture is altogether unknown. Considering it in respect of its provenance in Saxony, he states that in Chemnitz, Nittau, Dresden, Plauen, Leisnig and Glauchau no cases—or, as in Leipzig only quite isolated cases—come under clinical observation. He finds however that it is relatively prevalent in coal mining districts.

A. A.

BALL (Gordon H.). **Attempts to produce Encystment in Chilomastix.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Vol. 28. pp. 696–697.
—**Observations on the Life History of Chilomastix.**—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 85–96. [16 refs.]

In a series of experiments continued for several years and employing cultivation of *Chilomastix mesnili* in a number of standard culture media there was no evidence of anything approaching a life-cycle and no cysts were ever found. The standard culture media were modified in various ways—increased viscosity, increased concentration of substances normally present in faeces, addition of sterile rice starch or rice flour, cultivation on N.N.N. medium, alteration of temperature, alteration of pH concentration—but none of these modifications produced encystment. But HEGNER's results in transmission of *Chilomastix* and other mammalian protozoa to young chicks have been amply confirmed, the caecum of the chick forms a particularly favourable environment for *Chilomastix* and encystment occasionally occurs there.

A. A.

BLACKLOCK (D. B.). **Parasitology in the Medical Curriculum.**—*Brit. Med. Jl.* 1932. June 18. pp. 1138–1139.

This is a very sound and rational argument for the inclusion in the ordinary medical curriculum of some definite instruction in animal parasitology—not as a special subject for a particularly marked place in the professional examinations, but as a sort of leaven or vitamin penetrating and impregnating the pabulum of zoology. The author briefly and orderly reviews the animal parasites hurtful to mankind and indicates the large generality as well as the inherent properties of their importance. [The author's proposal would also help to open the students' eyes to the fact—which in the reviewer's student days had been almost forgotten—that biology is very far from being a despicable impediment in the road to professional erudition.]

A. A.

HERMS (W. B.). **Insect Parasitology**.—*Jl. Econom. Entom.* 1932. Apr. Vol. 25. No. 2. pp. 222-232.

A dissertation on familiar lines of a generally educative tone. A noteworthy matter is the statement [which leaves British withers unwrung] that, as curricula are now set, the student of insect parasitology "cannot secure adequate training through the channels of entomology alone." As the author rightly enough contends, "to become a parasitologist the student should be first of all a fundamentally well trained biologist"—which nobody can deny. A. A.

CLELAND (J. Burton). **Injuries and Diseases in Australia Attributable to Animals (other than Insects)**. Series IV.—*Med. Jl. Australia*. 1932. Jan. 30. 19th Year. Vol. 1. No. 5. pp. 157-166. [60 refs.]

A docket that will be appreciated by such as collect material for seasoning a drowsy treatise on medical zoology. It is a collection of short discursive notes on assaults committed upon man, the paragon of animals, by the lower creation exclusive of insects and snakes. The notes have a varied range; in one case, relating to a seal that dragged a man out of a boat and bit him, we are told of a constable's nocturnal adventure with a seal when he went to arrest what was supposed to be a drunken man reclining in the gutter. The items of this interesting miscellany are included under the following headings:—

Weapons of savages. Bites and various other injuries from camel, pig, seal, dingo, fox, wild cat, kangaroo, duckmole; magpie, eagle, cassowary, laughing jackass; crocodile, various lizards; shark, stingray, the horrid *Synanceia* and other fishes; Isopod crustacea; rat-mites, food-mites, harvest-mites, *Demodex*, venomous spiders, scorpions, centipedes, millipedes, cuttlefish, giant clam, leech, spicules of seaworms and sea-urchins, nettles of sea-anemones and jellyfish; *Trichomonas vaginalis*. A. A.

ORTIZ DE LANDAZURI (Eduardo). **Parasitismo intestinal en la zona del Protectorado de España en Marruecos**. [**Intestinal Parasitism in the Spanish Zone of Morocco**.]—*Medicina Países Cálidos*. Madrid. 1932. May. Vol. 5. No. 3. pp. 211-217. [14 refs.]

This investigation was undertaken to determine whether ankylostomiasis existed or not in the Protectorate. The method employed was examination of fresh specimens direct and by the concentrated saline of Willis-Molloy. Patients, 110 in number and from the medical, surgical, dermatological and venereal divisions of the Military Hospital, Tetuán, and 75 apparently healthy individuals in the kabila of Beni-Busera (Buhamed) were examined. The following were the most important findings: *Hymenolepis*, *Trichuris*, *Enterobius*, *Strongyloides* and *Giardia*, alone or combined, but ankylostomes were not seen in a single instance. H. H. S.

HILL (Rolla B.) & NIÑO ASTUDILLO (Jesus). **Los parasitos intestinales del hombre en Campo Lugar (Cáceres)**. [**Intestinal Parasites at Campo Lugar (Cáceres)**.]—*Medicina Países Cálidos*. Madrid. 1932. July. Vol. 5. No. 4. pp. 261-268. [18 refs.] French summary (4 lines).

Campo Lugar is a rural district in the south of the Province of Cáceres, with a population of 1,200. Hygienically, the conditions of

life are not enviable. Only 10 of the houses and none of the schools have any latrine accommodation, excreta being deposited indiscriminately in the yards behind the dwellings, in the roads or fields.

The authors examined the faeces of 130 children to the age of 15 years. To their surprise only 29 were found to be harbouring helminths. Twenty-three were infested with *H. nana*, 5 with *Ascaris lumbricoides*, 2 with *Enterobius vermicularis* and one with *T. saginata*. Not a single instance of Trichuris, Ancylostoma or *T. solium* infestation was found. Protozoal infection was more common; 92 had one or more parasites, the commonest being *Trichomonas hominis*, 34 cases, Chilomastix and Giardia each 32. Twenty-three showed a small ciliate provisionally diagnosed as *Balantidium minutum*.

Twenty of the children suffered from diarrhoea and 15 of these harboured flagellates, but the authors do not regard the latter as causing the former. Several children harboured more than one parasite, and one, 6 years of age, had ova of *H. nana* and *A. lumbricoides*, and cysts of *E. coli*, *G. lamblia*, Chilomastix and Iodamoeba, but was apparently in the best of health. No instance of *E. histolytica* infection was encountered.

H. H. S.

TALAMONTI (Luigi). Reperto degli esami di feci eseguiti nell'Istituto di Patologia Coloniale di Modena dal 1° Agosto 1930 al 30 Giugno 1932. [Faecal Examinations at the Modena Institute of Colonial Pathology.].—*Arch. Ital. Sci. Med. Colon.* 1932. Aug. 1. Vol. 13. No. 8. pp. 487-498. English summary (3 lines).

The period covered was 23 months, August 1930-June 1932 inclusive. The number of examinations carried out was very small, only 502 in all, but of these 384 or 76 per cent. were positive. The most important and the more common parasites were protozoal, helminths, with the exception of *Trichuris trichiura* found 39 times, being remarkably few; next in frequency being *Ascaris lumbricoides* 12, and *H. nana* 9. *E. histolytica* was present in 288 or 57 per cent., which is very high. ISOTTI in 1929-30 at the Laboratory of Tropical Pathology, Bologna, found it in 36.6 per cent. of 608 examinations, while BERTI reported only 1 per cent. among 760 miners on the Bologna-Florence line. Of the 288 recorded by the author, it was found alone in 130, and associated with others, notably flagellates and Blastocystis, in 158. The vegetative form was seen in 16, the precystic and cystic in 69, vegetative and cystic in 45. A table is given showing the different Provinces and districts from which the patients came; more than half were from Bologna Province and 112 from Bologna itself. *E. coli* was found on 43 occasions, or 8.3 per cent. of the total; in 37 of these it was associated with *E. histolytica*. Other frequent findings were *G. intestinalis* 84, *Trichomonas intestinalis* 28 and *Chilomastix mesnili* 29.

H. H. S.

DE CARVALHO (Jarbas). Dipteros hematophagos do municipio de Ponte Nova (Minas Geraes). [Blood sucking Diptera in Ponte Nova (Minas Geraes).].—*Brasil-Medico.* 1932. Aug. 20. Vol. 46. No. 34. p. 740.

In August 1931 the author started to collect insects from different parts of the municipality and he reports finding specimens of *Aedes aegypti*, *Cellia argyrotarsis*, *Myzorrhynchella lutzi*, *Taeniorhynchus fasciolatus*, *Mansonia titillans*, *Cellia tarsimaculata* and *Dendromyia* sp. He met with no specimen of Phlebotomus.

H. H. S.

MELLANBY (Kenneth). **The Influence of Atmospheric Humidity on the Thermal Death Point of a Number of Insects.**—Reprinted from *Jl. Experim. Biol.* 1932. Apr. Vol. 9. No. 2. pp. 222–231. With 5 text figs. [11 refs.]

This paper describes and figures a contrivance for exposing small insects (in this case rat-flea and larvae, body louse, blowfly, small meal-worm larvae) to high temperatures in air of controlled humidity. In exposures to various temperatures and humidities for one hour the humidity had no effect upon the death point, except in the case of large mealworms, which died at 1°C. higher in dry air than in moist. In exposures for 24 hours in moist air all the species died between 36° and 39.5°C.; in dry air "those insects not able to conserve their water died at low temperatures." A. A.

IYENGAR (M. O. T.) & SARATHY (M. K. P.). **A Constant Humidity Apparatus for Mosquitoes.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1091–1114. With 2 text figs.

In experimenting on the effect of different humidity concentrations on living mosquitoes in a closed chamber, *at concentrations lower than saturation point*, the difficulty occurs of maintaining constant humidity conditions along with some exposed water for the welfare of the insects. The authors have devised, and here describe and figure, a constant humidity apparatus that meets the requirements. The experimental tests of the apparatus and the explanation of its control of humidity under conditions of varying temperature are too technical to be summarized to any purpose. A. A.

CAZANOVE (F.). **Les moustiques à Dakar en 1931. [Mosquitoes at Dakar in 1931.]**—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 797–817.

Under the headings *Stegomyia*, *Anopheles*, *Culex*, and leaving specific distinctions unexpressed, the author deals with these insects at Dakar in 1931 from the point of view of the Sanitary Service, first emitting a sigh over the difficult task of that service in that year.

The number of haunts of *Stegomyia* destroyed in Dakar and the neighbouring villages in that year was 744. In the town itself the ordinary habitat of the larvae is the stored water jar of the native hut. The aim of the sanitary service is to abolish these jars and to install a supply of running water and organize a system of domiciliary visits. Besides the domestic water-jars the usual miscellany of domestic utensils that serve the insect as breeding-place near dwellings is described. The *Stegomyia* index is very much highest in September–October when the rainy season has provided the largest number of breeding-places outside those in and about dwellings and the insect is most active; this is the time too when natives from places in the bush where yellow fever may perhaps be endemic, flock to Dakar for employment, and perhaps may bring the infection with them.

The number of breeding-places of *Anopheles* destroyed was 106. At the same time material was collected for mapping the local species. But while the Sanitary Service strains to suppress *Anopheles* in the town of Dakar automobiles carry the inhabitants to places outside for the night, where they contract malaria, and also convey sportsmen into malarious country far from the town.

The number of breeding-places of *Culex* destroyed was 234, the months of most active destruction being August, September, and November. Among the shelters of *Culex* in the cold season are certain situations in drains and cesspools. Although all now attribute the transmission of dengue to *Stegomyia* the author states that he finds *Culex* behind all the cases (with one exception) of an articular fever without an eruption which he has entitled dengue. A. A.

HINMAN (E. Harold). **The Rôle of Solutes and Colloids in the Nutrition of Anopheline Larvae. Preliminary Report.**—*Amer. Jl. Trop. Med.* 1932. May. Vol. 12. No. 3. pp. 263-271.

A very technical paper dealing with attempts to estimate the value of water colloids and material in solution for the nutrition of Anopheline larvae in nature. The conclusion, for larvae of *Anopheles crucians* and *A. quadrimaculatus*, is that they can live for a time and make considerable growth under sterile conditions in Seitz-Werke filtered water from their breeding-pools, but cannot develop in the dialysate of water from the same breeding-pools. "Thus it would appear that the non-dialysable fraction of the water is of considerable importance in the nutrition of Anopheline larvae," and "that the dialysable elements alone are insufficient to support larval life." A. A.

HINMAN (E. Harold). **The Utilization of Water Colloids and Material in Solution by Aquatic Animals with Especial Reference to Mosquito Larvae.**—*Quarterly Rev. Biol.* 1932. June. Vol. 7. No. 2. pp. 210-217. [41 refs.]

A review of some of the literature on the question of the utilization by aquatic animals of water colloids and material in solution as food, beginning with PUTTER (1907-1922) who believed that marine animals could absorb liquid food not only by the intestinal tract but also through the skin (and gills in fishes), passing on to the critics who argued that the organic content in solution in seawater is almost negligible and to those who maintained that aquatic organisms could not at all derive nutrition from dissolved organic matter, and on the other hand to those supporters of PUTTER who demonstrated the permeability of the skin of certain amphibia and fishes both to organic and inorganic solutions, and finally concentrating on the utilization of material in solution by mosquito larvae.

Here the author refers to his own demonstration (1930) that the larvae of *Aedes aegypti* can from disinfected eggs be reared to maturity in Berkefeld-filtered water containing only organic matter in solution and colloids in suspension, and quotes the other workers who have shown that other larvae, including *Anopheles*, can find nourishment in sterile water and can grow for some time on normal water colloids or on water containing only dissolved products of decayed vegetation. He quotes also the workers from the Wisconsin University who have found that the natural fresh water of one of the local lakes contains nine times as much soluble nitrogen as the total plancton nitrogen; also other (unpublished) work demonstrating that *Aedes aegypti*, *Culex 5-fasciatus*, and *C. salinarius* get nourishment from the non-dialysable fraction of water from their breeding-pools, and much other cognate work recently published. The ability to absorb non-dialysable matter through the unbroken skin still requires demonstration, but why, asks

the author, should not such material be absorbed from the large amount of water that passes through the intestine of, *e.g.*, mosquito larvae?

This compendious review should be read in original, and a good list of relevant documents is attached to it. A. A.

BRUG (S. L.). **Chitinisation of Parasites in Mosquitos.**—*Bull. Entom. Res.* 1932. July. Vol. 23. Pt. 2. pp. 229–231. With 4 figs. on 1 plate. [11 refs.]

The author quotes with references several instances of the chitinous encapsulation of parasites in mosquitoes, that have been described and discussed—*e.g.*, “black spores” of *Proteosoma*-infected *Culex pipiens*, dead larvae of *Filaria bancrofti* in infected *Aedes variegatus*, and he here describes and figures another instance, namely the chitinization of an undetermined Protozoon parasite in a *Taeniorhynchus annulatus* that had been experimentally infected with *Microfilaria malayi*. A. A.

TROLLI (G.). Rapport préliminaire au sujet de la présence et de la vitalité des insectes et des rats, et notamment des moustiques, à bord des avions au Congo Belge. [**Preliminary Report on the Presence and Vitality of Insects and Rats, and Particularly of Mosquitoes, on board Aircraft in Belgian Congo.**—*Bull. Office Internat. d'Hyg. Publique.* 1932. Apr. Vol. 24. No. 4. pp. 603–612.]

A preliminary report of some investigations in Belgian Congo of the ability of the creatures—particularly of mosquitoes—known to transmit specific infections to maintain life at heights commonly traversed by aircraft. Many observations were made, mainly by medical officers of airports, and much detail is given. Only four times were living insects (mosquitoes all) captured in an airship on arrival from a voyage; in two cases after a flight of $6\frac{1}{2}$ hours made on the same day with calls at two places on the way, and in two cases after a flight of 8 hours with an all-night stoppage on the way; and in all four cases the greatest heights traversed by the aircraft were 1,000 metres. In two cases all the mosquitoes remained alive for some time after capture and in two cases they did not. In the air-voyage from Boma to Elizabethville no mosquito has been found, hitherto, in aircraft flying at 1,700 to 2,400 metres.

In addition to the search for evidence of the ability of infective insects to withstand the imminent deadly vicissitudes of the aircraft en route, inquest has been made of the mosquito tenantry of hangars and the air-planes from time to time stationary in them, and some experiments have been made of the effects of air-travel on caged mosquitoes. A. A.

GRIFFITTS (T. H.) & GRIFFITTS (J. J.). Sur le transport des moustiques par les avions. [**The Transference of Mosquitoes by Aeroplanes.**]—*Bull. Office Internat. d'Hyg. Publique.* 1932. June. Vol. 24. No. 6. pp. 948–952.

An interesting account in full detail of operations and observations demonstrating the part that can be, and is, taken by ordinary aeroplanes in carrying common mosquitoes like *Aedes aegypti* and *Culex*

quinquestriatus from place to place and for long distances. Several types of air-craft were used in experiment—Fokkers, Sikorsky water-planes, and Commodores—102 inspections of them were made in the course of experiment, and all the apparatus, etc., is described; 21 of the experiments disclosed the presence of mosquitoes in aircraft in the ordinary course of long voyages, with stoppages en route, under the ordinary conditions of passenger traffic with baggage to be shipped and unshipped and entrances and exits for it and passengers to be opened as required at ports of call. To discover the distance that mosquitoes may thus be carried, 40 stained mosquitoes, chiefly *Ae. aegypti* ♂♂ and ♀♀, were turned loose in different parts of a trimotor Fokker starting on a voyage of 1,250 miles (from S. Juan to Miami) making 3 stoppages and occupying 9 hours and 53 minutes, with an hour and 9 minutes for the 3 stoppages. At the end of the voyage 10 *Ae. aegypti*, 2 *C. quinquefasciatus*, and an unidentified mosquito were discovered in the cabin and fuselage of the aircraft. Some details of other experiments are given, but the authors' general conclusion is that if a considerable number of mosquitoes are in an aeroplane when she starts on a long journey (2,000 kilometres) to be completed in a day and with repeated stoppages at ports of call, about one-fifth of that number are likely to finish the journey. In the normal condition of natural mosquito-breeding about airports, however, they think it unlikely that an air-plane would be heavily infested when starting on a voyage, or that infected *Aedes aegypti*, although of course they might make the voyage, are not as important in starting epidemics as infected human beings are.

A. A.

SCHARFF (J. W.). **VII. Anti-Mosquito Measures.**—*A Note on Public Health Administration in the Northern Settlement.* [Penang, Straits Settlements.] pp. 16-23. With 29 photos.

Although at first sight this most excellent report appears to be merely of local interest, since it reviews the progress of antimosquito antimalaria work in rural areas of the Northern Settlement of Penang, it really has an oracular significance for all British Overseas Dominions that are affected and encumbered by malaria. One outstanding feature is a gallery of 32 beautiful photographs—a vivid and many-sided display of anti-mosquito work done in a few years (and still in progress). How has this work been done and how is it maintained? First of all, liberal financial provision has been made to the Health Branch of the Public Works Department for antimalaria work in rural areas, and in this provision the cost of a technically well-trained subordinate antimosquito staff is included. Constant search for larvae and breeding-places of dangerous mosquitoes is kept alive by mosquito surveys, and on these surveys anti-mosquito measures and programs are based and maintained. The text gives some account of the results of this work. In the Penang rural area, in the course of eleven years, there has been a progressive reduction in the annual number of deaths from malaria from 665 in the year 1921 to 395 in the year 1931; in eight other rural areas, in the course of 7 years (1925 to 1931) there has been a reduction in the annual number of boys with an enlarged spleen from 244 to 86, and in another eight rural areas, in the same 7 years, from 370 to 264. "The effect has been to transform the appearance of villages. In place of miserable and weakly children there are now

sturdy youngsters." Similar evidence of reduction in annual number of deaths from malaria and of schoolboys with enlarged spleens is given from the records of the Wellesley Province. A. A.

HOLT (R. L.) & KINTNER (J. H.). **Antimosquito Sprays.**—*Philippine Jl. Sci.* 1932. Apr. Vol. 47. No. 4. pp. 433-438.

Here are set forth several formulae for sprays for killing mosquitoes in large indoor spaces, such as hospital wards, without hurt to inmates or damage to draperies. The chief lethal agent in these sprays is pyrethrum, and a convenient and inexpensive contributory agent (and a vehicle) is purified kerosine; CS², and acetone, and chloroform were severally employed as solvents of pyrethrum, but since the first two of these, although highly toxic to mosquitoes, are dangerously inflammable and since also the odour of CS² is offensively unfragrant and the fumes of acetone are otherwise discomfoting to inmates, chloroform is the one recommended. Sixty grams of powdered pyrethrum are treated with 120 cc. of chloroform for two hours with frequent shaking, then filtered through a Buchner funnel, and the filtrate (averaging about 50 cc.) made up to 1,000 cc. with kerosine. The efficiency of this fragrant spray as an insecticide approaches that of mixtures prepared with the loathsome CS² and the nauseating acetone.

The manner of using the spray in a large ward, and the lethal effects upon insects, as described by the senior author of this paper, have been quoted in this *Bulletin* (*ante*, p. 318). A. A.

KLIGLER (I. J.). **The Movements of Anopheles at Various Seasons of the Year with Special Reference to Infected Mosquitoes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. pp. 73-88. With 2 graphs. [24 refs.]

Largely but not entirely from his own observation of anophelines (of a locality in Palestine) the author criticizes the habit of giving wide general application to generalities based on a single species. That *Anopheles* travels relatively short distances; that it is essentially zoophile; that it remains a long time in the house where it has fed; and that it has "homing" instincts, may be valid observations in time, place and season and for a particular species, but must not be assumed as universal substantiated truths. In Palestine, for instance, the range of flight (*e.g.*, of *A. elutus*) depends on various circumstances, besides being far greater in the period before hibernation when the insect is seeking shelter than it is in the active feeding and breeding season of spring and early summer. With regard to resting-places—the length of stay where the insects have fed and the strength of attraction of zoophily—for although it is likely enough that zoophile strains may occur, evidence is here given that what might in a particular village seem to be zoophily (preference of a stable) is a seasonal phenomenon or even an accident; other evidence from precipitin tests of blood taken in houses and stables, "tends to emphasize the restlessness of anopheles rather than their stability." With regard to the movements of infected mosquitoes, observations here recorded show that infected mosquitoes (cysts and sporozoites) were found in stables as well as in houses at all times of the year, which is no argument for a definite "housing" or "homing" instinct after infection. [This paper should be read; it is by papers of this kind, consisting of local observations

and critical examination of hypotheses, rather than by dogmatic enforcement of plausible assumptions that scientific knowledge of mosquitoes in relation to malaria is increased.] A. A.

ROUBAUD (E.) & GASCHEN (H.). Concurrence larvaire et peuplements anophéliens. [**Results of Overcrowding of Anopheles Larvae.**]—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 428–431. With 1 text fig.

The authors emphasize the stunting and the great mortality that occurs among young anopheline larvae late hatched on surface waters already crowded with older larvae; according to them it is particularly the "auto-elimination" of the larval issue of individuals thus stunted in their growth that contributes to the suppression of paucidentate females in an "unstable zoophile fauna." A. A.

BRADLEY (G. H.). **Some Factors associated with the Breeding of Anopheles Mosquitoes.**—*Jl. Agric. Res.* 1932. Mar. 1. Vol. 44. No. 5. pp. 381–399. With 6 text figs.

This critical comparison of environmental characteristics of areas where *Anopheles* is found breeding and areas where it is not found breeding in the Louisiana Delta region, what though it may not bring out anything strikingly new, is interesting generally as well as practically useful on the spot. The region lies in a flat country with many shallow "lakes" and sluggish overgrown and choked streams known as *bayous*. Characteristics noticed as favouring *Anopheles* were various kinds of green silkweeds, moderate growth of duckweed (*Lemna*), and vegetable flotsam, and such things as afford protection from natural surface foes. Characteristics unfavourable for *Anopheles* were rapid fall in level of surface of water (leading to stranding of protective flotsam); complete overgrowth of duckweed; predominance of blue-green silkweeds; shady waters with a large and varied plancton and less green aquatic vegetation. With regard to characters of the local waters that seemed to be indifferent for the breeding *Anopheles* the author instances summer temperature of atmosphere; range of pH concentration, the waters generally being alkaline, except in an unshaded impounded *bayou*; and composition of the plancton, it having no constant variation and everywhere containing about the same percentage of the same commonest genera of Flagellata, and gut examinations of larvae showing that all organisms of suitable size are likely to be swallowed. The paper is full of detail well digested and assimilated. A. A.

KOIDZUMI (Makoto) & MORISHITA (Kaoru). **The Identification of the Formosan Anophelines.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Mar. Vol. 31. No. 3 (324). [In Japanese. English summary pp. 28–29.]

"After careful re-examination of many specimens, and thorough collation of the earliest and latest literature," and much debate internal of a few "rather rare" species still recalcitrant, the authors decided finally that the species of *Anopheles* inhabiting Formosa are, like the Muses, nine in number, namely, *hyrcanus* var. *sinensis*, *lindesayi*, *minimus*, *jeyporensis* var. *candidiensis*, *maculatus*, *ludlowi*, *fuliginosus*,

tesseletatus, and *maculipalpis* var. *splendidus*. In the course of these final identifications 9 new species of previous Japanese authorization have been suppressed. A. A.

TOUMANOFF (C.). Sur les gîtes larvaires types des anophèles au Tonkin. [**Types of Larval Nurseries of Anopheles in Tonking.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 639–656. With 11 figs. on 4 plates & 4 graphs. [14 refs.]

A methodical study of the nurseries of *Anopheles* larvae in Tonking where 14 species are represented. Although there is more or less "ubiquity" of breeding-places for most of the species, some of them show marked predilections, and this is particularly so with *A. maculatus* which is adapted to streams with a swift current and rocky pools with little or no water-weed, and with *A. minimus* which is usually found in running water edged with vegetation and is very rare in stagnant water. *A. vagus* prefers stagnant water in spite of its ubiquity, but is often found in running water containing vegetation though never in clear swift water. *A. hyrcanus sinensis* has no particular preferences. *A. jeyporiensis* and *A. aconitus* are found most often in running water, though *aconitus* is also to be met with in the pools of the rainy season. *A. fuliginosus* likes water permanent or not, with plenty of vegetation, and avoids clear water. Of other Tonking species *barbirostris*, *philippinensis*, *kochi*, *karwari*, *aithenii* do not show any striking specific tastes. The fact that *A. maculatus* and *A. minimus*, which are the principal malaria-carriers of Tonking have their chosen breeding-places facilitates the operations of the medical entomologist. A. A.

TOUMANOFF (C.). Contribution à l'étude de la faune anophélienne d'altitude au Tonkin. [**Contribution to the Study of the Anopheline Fauna of the Highlands of Tonking.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 770–788. With 24 figs.

Anopheles lindesaii Giles and *A. gigas* var. *baileyi* Edw., the larva and adult of both of which the author describes, with parcel figures, are said to be of frequent occurrence in the highlands of Tonking, the larvae of the two species together forming 43–44 per cent. of the Anopheline larval fauna of the high country; that of *lindesaii* being common in summer (rainy season), and that of *gigas* var. *baileyi*, being found most frequently in winter (dry season), and both of them occurring in running water of various kinds. A third species, the larva of which inhabits the flowing water of the same heights, and is here briefly described, is *A. aithenii* James. A. A.

ESSED (W. F. R.). De gezondmaking van Banjoewangi, een typisch voorbeeld van species-assainering volgens Swellengrebel. [**Sanitation of Banjoewangi (Java). Species Sanitation.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1932. Vol. 21. No. 2. pp. 41–50. With 2 figs. on 1 plate. English summary.

The English summary states that in 1927 the author came to the conclusion that malaria at Banjoewangi on the east coast of Java was due to *Anopheles ludlowi* which was breeding in the fish-ponds formed from an old lagoon of a river there. He therefore advised that the dykes should be destroyed and the fish-ponds obliterated and the

dangerous area restored to its original primitive physiographical condition; and this was done at a cost of 23,000 guilders. At the present day instead of dangerous fish-ponds one sees a harmless "mangrove forest," and neither larvae nor adults of *A. ludlowi* are to be found; and as a consequence the recorded spleen-index of village children in the neighbourhood shows enormous improvements. "Thus is shown . . . a perfect example of species sanitation in the sense of SWELLENGREBEL." *A. A.*

WALCH (E. W.). Het verband tusschen de voorkeur van Nederlandsch-Indische anophelinen voor menschen- of dierenbloed en haar gevaarlijkheid (tweede mededeeling). [**The Relative Danger from Anthropophile and Zoophile Anophelines in D.E.I.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. May 24. Vol. 72. No. 11. pp. 682-709. [Refs. in footnotes.] English summary.

According to the English summary, precipitin tests of the blood in the stomach of Anopheles caught in houses or stables in Netherlands India disclosed 86 per cent. of *A. ludlowi* and 83 per cent. of *A. sinensis* to contain human blood, *A. ludlowi* being the most dreaded malaria carrier in the Netherlands India Archipelago, and *A. sinensis* perhaps the chief carrier in South Sumatra. With these two anthropophile species Walch is inclined to class *A. leucosphyrus* (a carrier in Sumatra), *A. punctulatus* (the most dangerous carrier in the Moluccas), and *A. umbrosus* (a dangerous carrier in West Borneo). Below all these on the list of biters of man come *A. aconitus* and *A. rossi* which are classed as usually malaria-carriers of secondary importance; and below these again *A. tessellatus* and *A. vagus*, which are classed as harmless. For *A. maculatus*, *A. kochi*, and *A. fuliginosus* the exact position is hard to assign at present, Walch can only call them more or less zoophile species. In districts where cattle are scarce, however, *A. leucosphyrus*, *A. maculatus*, and *A. aconitus* show a high percentage of females glutted with human blood; severe malaria (with an infection rate of 3.5 per cent.) caused chiefly by *A. aconitus* has been recorded in such a district.

The results of the above blood-precipitation survey of female Anopheles caught in houses and stables are offered as perhaps assisting to explain (1) why of over 40 species of Anopheles known to inhabit the Netherlands India Archipelago only about 10 species are known to transmit malaria in Nature; and (2) why one and the same species may be notorious as a malaria-carrier in some places and may be adjudged a harmless zoophile species in other places. *A. A.*

LALLEMANT (G. F. M. Avé), SOERONO (M.) & STOKER (W. J.). Proeven over de vliegwijde van enkele anophelinen. (Tweede Mededeeling.) [**The Range of Flight of Certain Anophelines.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1932. Vol. 21. No. 2. pp. 17-20. With 2 graphs. English summary (3 lines).

The English summary contains the bare statements that from a total number of 3,451 marked anophelines [liberated?] 51 were recaptured; and that among those recaptured were 3 individual *A. aconitus* at a distance of 900 metres, 1 *A. rossi* and 2 *A. sinensis* at a distance of 1½ km., and 1 *A. kochi* and 2 *A. tessellatus* at a distance of 1 km. *A. A.*

ROUBAUD (E.). Les races trophiques de l'*Anopheles maculipennis* décelées par les élevages expérimentaux comparés. [The Trophic Races of *Anopheles maculipennis* Disclosed by Experimental Breeding.]-C. R. Acad. Sci. 1932. May 9. Vol. 194. No. 19. pp. 1694-1696.

In his Paris insectarium at the Pasteur Institute M. Roubaud has reared 15 different European stocks of *Anopheles maculipennis* from stock collected in places in Spain, Italy, Austria, England, France. (He has found that the living insects can be sent from afar by post, with a minimum of packing apparatus, in winter; they may arrive at Paris in a state of inertia and seeming dead, but when placed in a moist atmosphere at a "mild temperature" they recover all their faculties). By study of these 15 European stocks M. Roubaud can distinguish among them two distinct types, namely a paucidentate type where the number of teeth in the female maxilla is not more than 14, generally 13-14; and a multidentate type where the females have 15 or more teeth in that organ.

The *paucidentate* stock is represented in 2 of the 15 places, Murcia in S. Spain and Tor Tre Ponti in the malarious Pontine Marshes. Their females have revealed "anthropophile preferences"; they preferred the human arm to the guineapig, recourse to the human arm having been indispensable for their true breeding and only with this guarantee did they breed true for three generations.

In all the other multidentate stock of this study the females preferred the guineapig to the human arm, taking their fill with ease and rapidity from that animal—in short, displaying their "elective zoophily." A good and true instance of this "endemic elective trophic zoophily" is obvious in the multidentate female *A. maculipennis* of the non-malarious district of Massarosa in Tuscany.

The distinction between the multidentate zoophile and the paucidentate anthropophile *Anopheles maculatus* is thus based upon that symbol of persistive constancy—the female maxilla. A. A.

ROUBAUD (E.). Recherches sur les variations trophiques et biologiques des peuplements de l'*Anopheles maculipennis*. Etude préliminaire. [Researches on the Trophic and Biologic Variations of the Populations of *Anopheles maculipennis*. A Preliminary Study.]-Bull. Soc. Path. Exot. 1932. July 6. Vol. 25. No. 7. pp. 755-762. With 6 figs.

Roubaud describes how he has brought together in the Insectarium of the Pasteur Institute a large number of *Anopheles maculipennis* from different regions, and how by study of their life in the laboratory he has been able to recognise 15 living stocks (*souches*) which are much easier to distinguish from the biological than from the morphological point of view. From his comparative studies he distinguishes broadly between Trophic races and Biologic races, the former being differentiated morphologically mainly by the maxillary index of the female, and the latter biologically mainly by the habits and behaviour of the female in winter. Thus of the Trophic races some are anthropophile (or at any rate are not specially addicted to zoophily) and others are distinctly zoophile. The Biologic or "poecilobiotic" races are sub-divided into those that are Homodynamous and those that are Heterodynamous. In the homodynamous series reproduction in the female is in full winter simply subordinated to the influence of cold and is not a

"process of spontaneous reproductive inertia"; under the influence of warmth such females may at times become active in winter. In the heterodynamous series the females in winter suffer an "obligatory ovarian diapause"; they are affected by a spontaneous ovarian inertia or asthenobiosis which lasts for weeks even when warmth at times intervenes. Another biological difference that may be estimated as racial is the variable aptitude of the females of *A. maculipennis* for coupling in winter, the extremes of this variability being distinguished in the opulent terminology of this paper as Stenogamy and Eurygamy. The small short-winged Holland variety *atroparvus* which reproduces readily in small cages is the chosen example of stenogamy, in contrast with the forms having longer wings, adapted for ample pre-nuptial flight, that exemplifying eurygamy. A. A.

HACKETT (L. W.), MARTINI (E.) & MISSIROLI (A.). **The Races of *A. maculipennis*.**—*Amer. J. Hyg.* 1932. July. Vol. 16. No. 1. pp. 137–162. With 5 figs. [16 refs.]

The authors' observations in many areas of Germany and Italy have confirmed FALLERONI'S differentiation of two races of *A. maculipennis*. One race, *labranchiae*, Falleroni, has a uniformly dappled egg with relatively small floats posteriorly placed. "The egg occurs as a light gray type in Italy (but never in pure culture) and as a dark gray type in North Germany." This race is found in brackish marshes near sea, or inland where the water has a relatively high salinity; "it also occurs in all areas so far studied where malaria is actually or potentially present, and it appears to be relatively more prevalent in dwellings than the other race." It is relatively active in houses and stables throughout the winter even in northern Europe—like *A. maculipennis atroparvus* of v. Thiel.

The other race, *messeae*, Falleroni, has "an egg irregularly pigmented in bars and angular patches but including always two heavy transverse bands just distal to the ends of the float structures which . . . are relatively large and long. This race occurs in inland fresh waters in Italy and Germany, in the proportion of 95 per cent. of the entire local *maculipennis* population, and each variation except pure black has been found in pure strains in several regions." It predominates in non-malarious areas, frequents stables more than dwellings, and goes into complete hibernation. Dark dappled grey, light dappled grey, and barred and banded eggs are figured in plenty. A. A.

DE BUEN (Eliseo). **Studies relating to the Biology of *Anopheles maculipennis* with Special Reference to the Dwellings of Man and Animals.**—*Jl. Trop. Med. & Hyg.* 1932. Aug. 15. Vol. 35. No. 16. pp. 242–247. With 3 charts.

These studies, proceeding from the Malaria Institute, Naval Moral de la Mata, Spain, and full of local detail regarding the distribution of larvae and the movements of adults of *Anopheles maculipennis*, were addressed chiefly to the question, why do anophelines enter stables and dwellings? why do they linger in them? why do they leave them? The conclusions reached with regard to larvae are that the broods of the first generation are to be found in waters close to both inhabited dwellings and stables, but later generations may be found in all waters far or near. In the area under observation females may breed in cold

and wet weather and may emerge even in the excessive heat of a dry summer; this may explain the short survival of such adults in open dry country in summer. In summer many people as well as cattle live scattered in the open; thus the need for long-distance flights is minimized. With regard to adults, mostly they enter habitations in order to bite; they remain in them to digest their food and mature their eggs; and they leave them in order to breed. In human dwellings the conditions of life are less favourable than in stables, so that individuals leaving the house with their eggs still undeveloped are more numerous than those so leaving stables. Some females return to the places where they have sheltered. Some bite in the open air as well as in houses. During the warmest months the number of *A. maculipennis* seen emerging from dwelling-places diminishes, and during cold weather they do not come out at all. These studies, of course, are meant to show how *A. maculipennis* keeps the tenour of its way in a particular locality. A. A.

FREEBORN (Stanley B.). **The Seasonal Life History of *Anopheles maculipennis* with Reference to Humidity Requirements and "Hibernation."**—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 215–223. With 3 graphs.

According to the author there are six generations of *Anopheles maculipennis* in the Sacramento Valley of California, and the adults of the second and perhaps third generations have a life too short to transmit malaria. Activity begins in mid-February with a migration of wintering females into areas well out of the natural range of the species, where breeding is attempted but is "ecologically impossible." From the end of April until the third week in June the numbers of adults steadily increase, and then from June to beginning of September a slump occurs. This is explained as due to seasonal climatic changes—constant high temperature, and the failure of high humidities to protect the insects from its effect. Even at a relative humidity of 80 per cent. three days was the maximum length of life. Semi-hibernation lasts from November to late January or early February. There is no true hibernation, the females throughout winter biting on warm days or in heated buildings and often changing their resting-places. The migratory flight of *A. maculipennis* is compared with the migration of *A. elutus* in Palestine observed by KLIGLER and MER. A. A.

LEVENSON (E. D.). Observations sur l'action de différents agents chimiques sur le développement des larves d'*Anopheles maculipennis*. [**Action of Chemicals on Development of Larvae of *A. maculipennis*.**]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 10. pp. 499–504. With 1 fig. [In Russian. French summary.]

Experiments were conducted upon the larvicidal properties of caustic soda, and sulphuric, hydrochloric, nitric and carbolic acids, added to artificial peat-holes inhabited by larvae of *Anopheles maculipennis*. The main effect of these chemicals was to alter the pH. Satisfactory results were obtained with sulphuric acid only. If added in the proportion of 0.02 per cent. of the total volume of water to peat-holes with a clayey bottom it produces a marked fall of pH from 6.03 to 2.09—the latter reaction being maintained for a considerable time and killing off all the larvae. C. A. Hoare.

RUSSELL (Paul F.). **The Control of *Anopheles minimus* Mosquito Larvae in the Philippines by Stranding and Flushing. First Report.**—*Philippine Jl. Sci.* 1932. Apr. Vol. 47. No. 4. pp. 439-447. With 1 text fig. & 4 figs. on 1 plate. [10 refs.]

The chief carrier of malaria in the Philippines is said to be *Anopheles minimus*. (*A. maculatus* also has there been convicted as a natural carrier. "The so-called *A. ludlowi* of Luzon is not a vector in nature.") The larvae of both *A. minimus* and *A. maculatus* are most often found in the small streams of the foothills of the islands. An experiment of "periodically closing and opening a dam situated about halfway along the length of the stream—done twice on one day a week" was followed by a remarkable reduction in the number of larvae both above and below the dam. This method of stranding and flushing is recommended as simple and inexpensive for the stated conditions. *A. A.*

KING (W. V.). **Three Philippine *Anopheles* of the *Funestus-minimus* Subgroup.**—*Philippine Jl. Sci.* 1932. Aug. Vol. 48. No. 4. pp. 485-524. With 8 figs. & 2 plates. [21 refs.]

The author states that the *funestus-minimus* subgroup of *Anopheles* is represented in the Philippines by 3 species, one of which has been confused with the other two; this species is here identified as *A. mangyanus* Banks. The other two species are identified as *A. minimus* var. *flavirostris* Ludlow, and *A. filipinae* Manalang. The var. *flavirostris* has come to be considered the only Philippine *Anopheles* of serious importance in malaria. Descriptions of the three species are given, together with notes on the "typical" *A. funestus*, *A. minimus*, and *A. aconitus*. *A. A.*

SHANNON (Raymond C.). ***Anopheles gambiae* in Brazil.**—*Amer. Jl. Hyg.* 1932. May. Vol. 15. No. 3. pp. 634-663. With 2 figs. & 4 maps. [22 refs.]

In March 1930 the notorious African malaria-carrier *Anopheles gambiae* Giles was discovered breeding in the city of Natal, Rio Grande do Norte, Brazil, and shortly after the discovery an unusually severe outbreak of malaria occurred in the vicinity of its breeding-grounds there. Its transport from Africa "appears to have been made possible" either by aircraft or by the quick mail-boats that require but four days for the trip from Dakar in Africa to Natal in Brazil. In investigations made nine months after its discovery "covering the coastal area of Brazil from Recife, Pernambuco, to Belem, Para" it was found only in Natal.

The paper contains, in addition to various useful illustrations in the text, a large amount of critical detail about *A. gambiae* [= "*Pyrethrophorus costalis*"] both in its indigenous tropical African home and in its new Brazil environment; drawing attention, with regard to its African record, (a) to its facile breeding in shallow sun-exposed waters, and particularly to ditches, drains, pits, rain-pools, etc., besides natural streams, backwaters, etc., and (b) to its practical disappearance in the dry season in certain arid African regions where that season is pronounced; and giving, with regard to its invasion of Brazil, an account of its spread and an estimation of its prospects there and descriptions of forty-two of its investigated Brazil breeding grounds. *A. A.*

EARLE (Walter C.). **Notes on the Life History of *Anopheles albimanus* and *grahamii*.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. Mar. Vol. 7. No. 3. pp. 381–384.

These observations of *Anopheles albimanus* testify that the majority laid their eggs on the 2nd (sometimes 3rd) night after a feed, beginning at 9 p.m., the average number being 160. The minimum term from egg to pupae was from 4 to 5 days. A volume of detail is given. *A. A.*

GHOSH (B.). **Comparative Study of Larval Characters of *A. ludlowii* (Theobald) and *A. subpictus* (Grassi).**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1085–1090. With 6 text figs.

[If *A. Ludlowii* be really a species distinct from *A. subpictus*] then what the author considers to be distinguishing characters of the larvae of the two "species" are here stated and figured. *A. A.*

ROUBAUD (E.) & COLAS-BELCOUR (J.). **Adaptation à la vie submergée hivernale chez les larves d'*Anopheles plumbeus*. [Adaptation of Larvae of *Anopheles plumbeus* to Hibernial Submergence.]**—*C. R. Acad. Sci.* 1932. June 13. Vol. 194. No. 24. pp. 2178–2180.

Recalling some well-known facts about the tree-hole breeding *Anopheles plumbeus*, which winters as a larva, commonly submerged, the authors state that at that season the larvae are generally suspended vertically, head-downwards, by the caudal setae and that they can live thus completely submerged for 19, 47, or even 61 days and can stand successive freezing and thawing of the watery medium. Breathing in such circumstances would be carried on by the tracheal gills. *A. A.*

ROUBAUD (E.) & COLAS-BELCOUR (J.). **Observations sur la biologie de l'*Anopheles plumbeus*. I. Le comportement larvaire. [Observations on the Biology of *Anopheles plumbeus*. I. Larval Behaviour.]**—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 763–770. With 4 figs. on 1 plate. [15 refs.]

In describing the fairly well-known natural history of the tree-hole larva of *Anopheles plumbeus*, the authors, working in the laboratory, draw attention to the following points. With regard to the water of the tree-hole, with its usual dark colour and richness in dissolved organic matter including tannin, although it may attract the pregnant female she may also sometimes deposit her eggs in clear pure water in which the larvae may develop as adequately as larvae nourished in a tannic maceration. Although the larvae from the tree-hole are obviously negatively phototropic, they soon get used to light when treated experimentally; and, conversely, when experimentally inured to light they soon resume their "normal lucifugal character" if returned to obscurity. Many writers have noticed the small amount of liquid often contained (along with leaves and debris) in the tree-holes; the authors find that the evolution of larvae may be completed under conditions of mere moisture in which the larvae cannot swim freely. Great attention is directed to attitudes assumed by the larva, particularly to a fixed position vertically head-downwards that the young larvae may take when completely submerged in winter and to the prehensile modification of the caudal setae that facilitates this fixation under water. *A. A.*

DAVIS (Nelson C.). **The Effects of Heat and of Cold upon *Aedes (Stegomyia) aegypti*.**—*Amer. Jl. Hyg* 1932. July. Vol. 16. No. 1. pp. 177-191. [19 refs.]

This paper deals with the effect of high and low temperatures on *Aedes aegypti*; Part I deals with the effect on the eggs, Part II with the effect upon the adults. Both parts contain a good deal of cited introductory detail of a retrospective kind besides the description and tabulated summaries of the author's experiments. 1. With regard to eggs. In these experiments (the methods of which are described in detail) a temperature of -5.5°C . killed eggs in about 48 hours: even after 6 hours the larvae that hatched from matured eggs were unable to survive, and after 30 hours some fresh eggs hatched later on and one larva pupated. At 0°C . a few fresh and matured eggs hatched after an exposure of 11 days. At 8° to 10°C . a small percentage of fresh eggs hatched after an exposure of 14 days, but none of the larvae lived; matured eggs however appeared to be not affected even after 7 to 8 weeks. At 36°C . no effect on either fresh or matured eggs after exposure of 2 weeks. At 40°C . fresh eggs all dead at 48 hours, matured eggs dead before end of week. At 45°C . both types of eggs dead at 24 hours.

With regard to adults. Temperatures of 36°C . or higher had a very deleterious effect on larvae, pupae, and adults; many pupae died, and some of the adults were drowned beside their pupal cases; At 36°C . a colony of the mosquitoes died out in the second generation. At 18°C . the mosquitoes appeared lethargic, but larval growth and pupation were noticeably accelerated after a change to 19°C . A. A.

BONNE-WEFSTER (J.) & BRUG (S. L.). **The Subgenus *Stegomyia* in Netherland India.**—*Bijblad o.h. Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. Apr. Bijblad 2. pp. 39-119 (5-85). With 22 text figs. [6 pages of refs.]

Stegomyia in general; morphology, taxonomy, biology. *Aedes (Stegomyia) fasciatus*; morphology, breeding-places, eggs, larva, pupa, imago, parasites, natural enemies, as a disease carrier, control, geographical distribution. Morphology and biology of *Ae. (S.) albopictus* and *var. variegatus* and *var. albolineatus*; and of *annandalii*, *gardnerii*, *desmotes*, *w-albus*, and *treubi*. A. A.

GRANT (H. G.), NEWMAN (Barclay M.) & WOOD (Pierce D.). **The Action of Colloidal Paris Green on the Larvae of *Culex apicalis*.** **A Preliminary Report.**—*Public Health Rep.* 1932. June 3. Vol. 47. No. 23. pp. 1239-1247.

Observations and experiments upon the toxicity of four different colloidal preparations of Paris green for *Culex apicalis* larvae, at Richmond (Virginia) July-October. Under laboratory conditions colloidal Paris green was toxic in one part to five million parts of water (by weight). "Colloidal preparations made from a solution of Paris green in concentrated NH_4OH gave the best results of any of the preparations used, killing all larvae placed in 1 to 5,000,000 dilutions within periods ranging from 19 hours to 3 days." It may possibly "be developed as an effective and comparatively inexpensive mosquito larvicide." A. A.

SINTON (J. A.). **Notes on Some Indian Species of the Genus Phlebotomus. Part XXX. Diagnostic Table for the Females of the Species Recorded from India.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 55-74. With 57 figs. on 3 plates. [10 refs.]

The known Indian species of *Phlebotomus* in the year 1910 numbered seven, and they were specifically differentiated mainly by differences of colour and variations in wing-venation. At the present time 27 Indian species and 6 varieties are recognized by the author of these Notes and of the Diagnostic Table for the identification of the females of these species. In the introduction to this Table the species are arranged in 3 main groups according to the nature and distribution of the abdominal hairs, and within each group are differentiated mainly by structural variations in the buccal cavity, pharynx, and genitalia (spermatheca and male genitalia). The Notes also contain an explanation of the terminology of the Table, instructions for the collection, preparation, storage, mounting and examination of specimens, and a statement of the geographical distribution of the Indian species.

A. A.

CORSON (J. F.). **A Note on Tsetse Flies.**—*Jl. Trop. Med. & Hyg.* 1932. Apr. 1. Vol. 35. No. 7. pp. 97-98.

The flies of this paper are *Glossina morsitans* and *G. pallidipes*. When captured wild flies of these species were allowed to feed on sheep and goats fatal infections of *T. congolense* and of *T. brucei* (or *rhodesiense*) quickly appeared among those animals. Laboratory-bred flies (from pupae of captured flies of both species) when allowed to feed on the sheep and goats thus infected were in the course of about six weeks found in a large proportion of cases to have the salivary glands infected.

The pupal term in male flies was usually two days longer than in females. It was found that a fly in captivity may abstain from feeding for as much as fourteen days without apparent detriment or loss of activity. The flies, in bottles, bit readily in complete darkness. They readily attacked and fed on fowls, guineafowls, and francolins, the birds being quite indifferent to them. Pairing took place between males of *G. swynnertoni* and females of *G. morsitans* and all the resulting pupae gave issue to females resembling *G. morsitans* more than *G. swynnertoni*. The author does not claim novelty for all his observations. A. A.

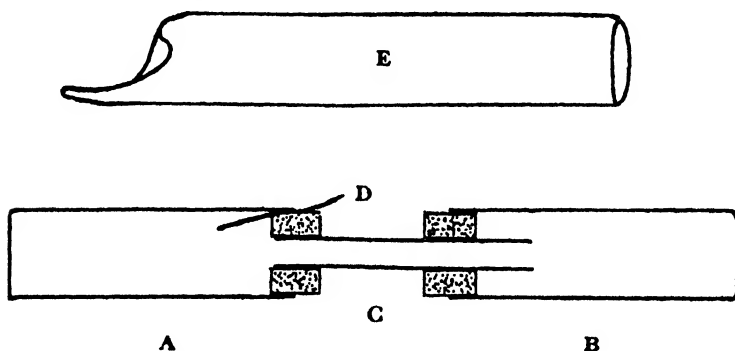
SYMES (C. B.) & ROBERTS (J. I.). **A List of the Muscidae and Oestridae causing Myiasis in Man and Animals in Kenya, recorded at the Medical Research Laboratory, Nairobi.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Apr. Vol. 9. No. 1. pp. 18-20.

Species of Muscidae known to cause myiasis in man and of Oestridae in animals recorded in the laboratory at Nairobi are: *Sarcophaga* 2 spp., 4 cases (2 being in stools); *Calliphora* 1 sp., 1 case; *Lucilia sericata*, 4 cases; *Chrysomya bezziana*, 1 case; *Auchmeromyia luteola*, common; *Cordylobia anthropophaga* common; and *C. rodhaini*, 1 case in European, common in animals. Species of Oestridae:—*Oestrus ovis*, in sheep; *Oestrus variolus*, in nose of hartebeest; *Gedoelestia cristata* and *G. hassleri* in nose of hartebeest. A. A.

HICKS (E. P.). **A Simple Apparatus for breeding Fleas.**—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 147–148. With 1 fig.

The breeding apparatus figured and described, which was devised for dealing with cultures of the chigger (*Tunga penetrans*), is for use in the breeding of fleas against the time when the larvae are about to pupate; by its use when in the further course of time the adults issue from the cocoons they can be removed from time to time without interference and damage to the rest of the culture.

"Two glass containers, A and B, are fitted with bored corks through which passes the glass tube C. One end of the tube is flush with the inner surface of the cork in A, the other end projects into the interior of B. A slip of damp blotting paper, D, may be inserted between the cork and side of A to raise the humidity, if necessary. In dealing with a flea as small as *T. penetrans* it is as well to cover the corks with wax, to prevent the escape of the fleas through some unnoticed crevice. A cylinder of brown paper, E, is made to fit the apparatus from the base of A to the cork of B. This is loose and can be slipped on and off.



A Simple Apparatus for Breeding Fleas.

[Reproduced from the *Annals of Tropical Medicine and Parasitology*.]

"The size of the containers in use is 75×22 mm., and the bore of the tube is 8 mm.; but presumably the dimensions are not of great importance.

"The culture of the larvae, with the material in which it is breeding, is placed in A, the apparatus is closed, and the brown paper cylinder slipped over A. As the adults emerge inside the dark container, they make for the light and find themselves in B. When sufficient adults have collected, the container B, complete with its cork, is slipped off the tube C, cotton wool plugs are fitted into the tube C and the cork of B, and the fleas are killed, if desired, by blowing chloroform vapour into B by means of a capillary pipette. When the fleas have been removed, B may again be fitted on to the tube C, after allowing a short time for the chloroform vapour to disperse. During the time that B is separated from the apparatus, the brown paper cover should be removed from A, so that the fleas may not be encouraged to wander down the tube.

"This apparatus made it possible to observe that, of a culture of *Tunga penetrans* bred from eggs laid by a number of fleas on the same day, the females emerged before the males."

A. A.

BUXTON (P. A.). **The Climate in which the Rat-Flea lives.**—*Indian J. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 281–297. With 4 figs. [23 refs.]

This is not an easy paper for summary. In his discussion the author states that it "is not principally a record of fact, but a discussion of a

point of view" and "is agnostic rather than informative." And in his summary the point of view appears in a suggestion that "if further facts were available and if more were known of the precise relation between climate and fleas at various stages, it would become possible to construct buildings within which the climate would be unfavourable to fleas." From this point of view the knowledge wanted is to be obtained by study of temperature and humidity in granaries, cellars, rat-holes, and in the rat's nest and the dust in which the larvae live; and here information is given on methods and apparatus of study and particularly on the measurement and record of changes in humidity, where ordinary meteorological methods are inadequate. A. A.

LEESON (H. S.). **The Effect of Temperature and Humidity upon the Survival of Certain Unfed Rat Fleas.**—*Parasitology*. 1932. June. Vol. 24. No. 2. pp. 196–209. With 4 charts. [17 refs.]

The technique of previous experimental work on effect of temperature and humidity on unfed fleas is criticized, and the author's methods and apparatus are recalled. In his experiments 2,027 *Xenopsylla cheopis*, 999 *X. astia*, and 646 *Ceratophyllus fasciatus* were used, all unfed and less than 24 hours old at the outset of the experiments. The following are the conclusions.

Length of life is not affected by sex. High temperatures and low humidities tend to shorten life. Low temperatures and high humidities (with a possible optimum of about 90 per cent.) tend to prolong it. Humidity is at maximum efficiency in this respect at about 18°C.; but at 37°C. humidity ceases to have any effect upon the duration of life of unfed fleas. "There is no direct proportion between survival of unfed fleas and saturation deficiency of the atmosphere at any temperature." *C. fasciatus* was the longest lived at similar atmospheric conditions. *X. astia* lived longer than *X. cheopis* at all humidities at 23°C. A. A.

- i. GIRARD (G.), ROBIC (J.) & HÉRIVAUD (A.). Note sur les puces de la région de Tananarive. [**Rat Fleas of Antananarivo.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 381–383.
- ii. FONQUERNIE (J.). Les puces du rat à Tananarive.—*Ibid.* pp. 383–386.
- iii. ——. Les puces domestiques à Tananarive.—*Ibid.* June 8. Vol. 25. No. 6. pp. 542–543.
- iv. ——. Les puces domestiques à Tananarive (note complémentaire). *Ibid.* July 6. Vol. 25. No. 7. p. 710.

i. From the first three authors we learn that in the Antananarivo district plague is endemi-epidemic and that the transmission of infection among human beings seems to be not worked by *Xenopsylla cheopis*. A study of the local fleas made between October 1930 and August 1931 disclosed the following facts: In twelve houses "indemnified" from plague the 3,000 fleas caught on natives and Europeans and in traps were 91 per cent. *Pulex irritans*, 10 per cent. *Ctenocephalus* (in houses with dogs and cats) and 1 per cent. *Echidnophaga gallinacea*; in three warehouses in the centre of the plague zone and frequented by rats the 526 fleas caught were 341 *Pulex irritans*, 184 *Ctenocephalus*, and 1 *X. cheopis*; and in some houses free from plague corpses, where 300 fleas were caught, 232 were *Pulex irritans*, 63 were *Ctenocephalus*, 11 were *E. gallinacea*, and 4 were *X. cheopis*. Of these 300 fleas 126 (including

the 4 *X. cheopis*) were marked and inoculated into 8 guineapigs and 11 mice—but none of these animals contracted plague. "It is exceptional then to find *X. cheopis* off the body of the rat, even in houses infected with human plague. Is *Pulex irritans* to be held guilty of transmitting bubonic or septicaemic plague among men? The question should be reconsidered and studied at Tananarive."

ii. The only information that Dr. Fonquernie can get about rat-fleas collected at Antananarivo is that given by GIRARD and LEGENDRE (*Bull. Soc. Path. Exot.* 1925, Nov. 11. See this *Bulletin*, 1926, Vol. 23, p. 292), and that given in a note (April-May 1925) published by the *Office International d'Hygiène Publique*, which determine them to be *Xenopsylla cheopis* 60 per cent., *Lept. musculi* 25 per cent., *Echidnophaga gallinacea* 15 per cent.—and these were floated from rats drowned in cresol solution.

Fonquernie gives here his monthly returns of fleas captured and examined and of cases of "murine" plague and human plague for a whole year. During the whole year over thirty-eight thousand fleas were captured from rats in Antananarivo and over thirty-thousand were examined. Of these nearly 23,000 were *Echidnophaga gallinacea*, over 5,600 were *X. cheopis*, nearly 2,300 were *Leptopsylla musculi*, 37 were *Ctenocephalus felis*, and 12 were *P. irritans*. During the whole year 10 cases of murine infection and 50 cases of human infection (bubonic) are noted.

iii. The author confirms the observations of GIRARD *et al.* that the domestic flea of Madagascar is *Pulex irritans*, *X. cheopis* being excessively rare in habitations of Antananarivo and its environs although it abounds on the rats of that region. Of 410 fleas collected by him there from March to September in habitations free from plague, 275 were *P. irritans*, 102 were *Ctenocephalus felis*, 25 were Tunga and 7 *Echidnophaga*, but *X. cheopis* was represented only by a single individual and *Leptopsylla musculi* not at all. It would seem, he infers, that the fleas of plague-stricken habitations still require investigation.

iv. A further note stating that of 998 fleas collected from March to December in 33 plague-stricken houses 890 were *Pulex irritans*; 8 were *X. cheopis*; 55 were *Ct. felis*; and 45 were Tunga. Of the 8 *X. cheopis*, however, 6 were captured, along with 3 *P. irritans* and 6 *Ct. felis*, in one house where cases of pulmonary and septicaemic plague occurred in succession.

A. A.

i. SYMES (C. B.) & HOPKINS (G. H. E.). **Notes on Fleas of Rats and Other Hosts in Kenya.**—*Colony & Protectorate of Kenya. Med. Dept. Records of Med. Research Lab. No. 1.* 1932. Jan. 57 pp. With 1 chart. [11 refs.]

ii. ——. **Notes on Rats, Fleas and Plague in Kenya (II).**—*Ibid.* No. 3. 1932. Jan. 28 pp. With 3 charts.

i. This painstaking report deals severally with the eight Districts of Kenya, and is full of detail of local value regarding the specific provenance of the rodent and other hosts and the specific host-preferences of the rat-fleas in each district. In a general summary the fleas caught from these hosts numbered 32,553 individuals belonging to fifteen species. Of these, 11,463 were *Xenopsylla cheopis*; 8,920 *X. brasiliensis*; 191 *X. humilis*; 106 *X. astia*; 2,146 *Dinopsyllus lypus*; 535 *Ctenophthalmus cabirus*; 397 *Leptopsylla segnis*; and 5,585 *Echidnophaga gallinacea*.

X. cheopis is most commonly found on house-rats (*R. rattus*) and in more or less permanent buildings as in Nairobi, *X. brasiliensis* more commonly on the indigenous multimammate *R. coucha* in native huts and rustic constructions of mud and thatch. *X. cheopis* may be locally common on field-rats, particularly on *Arvicola abyssinicus* (vole). Mombasa is thought to be apt for *cheopis*-borne plague at all times of the year. There is circumstantial evidence against *X. brasiliensis* in Mombasa and S. Kavirondo, and suspicion against the field-rat (vole) *A. abyssinicus* in the Nakuru District.

ii. This is a continuation of the above report ; it covers a term of 17 months to May 1930 and deals with the breeding, nests and the fleas of the common local rodents. The fleas of *R. rattus* are *X. cheopis* and *brasiliensis* and in small numbers *D. typhus*, *L. segnis*, and *E. gallinacea* ; *X. cheopis* mostly on town *rattus*, *X. brasiliensis* more in *rattus* of native reserve and estate areas. The prevalent flea on the three commoner field rats, particularly on *R. coucha*, in Nairobi is *Dinopsyllus typhus* ; another adherent of field-rats and their nests is *Ctenophthalmus cabirus*. There seems to be little doubt that both *X. cheopis* and *brasiliensis* and also *Dinopsyllus typhus* are concerned in plague transmission in Kenya.

A. A.

MEIRA (João Alves). Alguns dados estatísticos sobre as pulgas de ratos na cidade de S. Paulo. (2a nota) [**Rat-Fleas in S. Paulo.**] —*Brasil-Médico*. 1932. May 7. Vol. 46. No. 19. pp. 429–432.

Rats caught were divided into two categories (1) those in and about dwellings, and (2) those in and about warehouses. *Epimys norvegicus* largely predominated among the former, constituting 88·1 per cent. ; among the latter, though still the most common, it was found but little more than twice as frequently as *R. rattus* and *Mus musculus*. Of 363 rats caught in and about dwellings 42 per cent. harboured fleas, the total being 1,784, the flea index of the whole being thus 4·9, of the infested 11·7 ; 88 per cent. (544) of the second (warehouse) group of 618 had fleas, altogether 8,164, *i.e.*, an index of 13·2 of the whole, 15 of the infested.

In the dwellings 85 per cent. of the fleas were *X. brasiliensis* ; in the warehouses nearly half (46·8 per cent.) were *Ctenopsyllus musculus*. *X. cheopis* was much higher among the warehouse rats [but actual figures are not stated].

H. H. S.

KOPSTEIN (Felix). De verspreiding van *Xenopsylla astia* op Java en haar beteekenis voor de epidemiologie der bubonpest. [***X. astia* and the Epidemiology of Bubonic Plague in Java.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. May 10. Vol. 72. No. 10. pp. 618–633. With 2 maps in text. [41 refs.]

In the coastal zone of Java the author examined the flea population of 974 rats of various species and 275 shrew mice (*Pachyura murina*). He found 2,279 *Xenopsylla cheopis* against 570 *X. astia*. The latter was absent in the south coast ports and on the north coast in Batavia and Pasoeroean. The *astia* quote was generally 4–24·8 per cent. with two exceptions, 50 and 100 per cent. respectively. Its spread is a very irregular one, which can only be ascribed to sea transport. Its frequency was the same in various species of rats.

The natural limitation of explosions of plague in many coastal towns cannot be ascribed to local preponderance of *X. astia*. W. J. Bais.

CUMMINGS (Bruce F.) [the late]. **The Bed-Bug, its Habits and Life-History and how to deal with it.** Third Edition. Revised, Enlarged, and Partly Rewritten by Major E. E. AUSTEN, D.S.O. British Museum (Natural History). Economic Series No. 5.—27 pp. With 7 figs. 1932. London: Printed by Order of the Trustees of the British Museum. [2d.]

This edition has been revised, amplified, and furnished with an analytical index. The section on "Bedbugs and Disease" has been rewritten in the light of recent knowledge, the insect being divested of its terrors as a convicted transmitter of disease among mankind, although its mischievous powers in the experimental arena are all recorded. The section on "Remedies," and now entitled "How to Eradicate Bed-bugs," has also been much enlarged and augmented. Here we find besides the simple remedies for allaying irritation caused by its bites, all the sterner methods for destroying the odious creature properly set forth—boiling water; emulsion of kerosine or other similar oils; fumigation with sulphur (3 lb. for each 1,000 c. ft.); various means of overheating infested chambers (to 120°F. or more); formalin vapour (produced by adding chloride of lime to an equal quantity of formalin—in proportion of one lb. of the former to one pint of the latter); HCN gas; and calcium cyanide powder (2 lb. to 1,000 c. ft. of space).

The form and features of the insect are described (and figured); its mouth parts and its manner of sucking blood; its habits, its resistance to starvation and cold, so that it can live (at 60° to 65°F.) for 136 days unfed, and for 9 months after a single feed, and can survive the winter in uninhabited houses despite such starvation; its life history in all its stages from egg onwards and its length of life; its natural enemies; and its zoological affinities and zoological distribution.

A. A.

GATER (B. A. R.). **Malayan Trombidid Larvae, Part I. (Acarina: Trombididae). With Descriptions of Seventeen New Species.—Parasitology.** 1932. June. Vol. 24. No. 2. pp. 143–174. With 16 figs. [51 refs.]

Some salient facts in the history of tsutsugamushi disease and tropical typhus and in the transmission of these diseases to man (from reserves in rats and certain other rodents) by Trombidid larvae are here reviewed, and 24 species of Malayan Trombidid larvae that have been found on species of *Rattus* occurring in Malaya are critically noticed (17 of them being described as new) and severally referred to their host and their provenance.

A. A.

COLE (A. C.), Jr. **The Olfactory Responses of the Cockroach (*Blatta orientalis*) to the More Important Essential Oils and a Control Measure formulated from the Results.—Jl. Econom. Entom.** 1932. Aug. Vol. 25. No. 4. pp. 902–905.

For simple practical purposes the olfactory responses—positive, or negative, or indifferent—of the cockroach to 32 essential oils, here tabulated for choice of an ingredient imparting attractiveness to the bait of cockroach-traps, may be interesting and perhaps useful.

A. A.

SIEMENS (Hermann Werner). *Culicosis bullosa*. [*Culicosis bullosa*.]—*Arch. Dermat. u. Syph.* 1932. Apr. 22. Vol. 165. No. 2. pp. 490-492. With 1 text fig.

Under this name is described and figured a simple eruption, on the leg of a child, of 2 or 3 distended blisters about the size of a pea and quite free from itching which the author after consideration thinks to be most probably "a non-typical reaction to a gnat-bite." *A. A.*

SODY (H. J. V.). On *Crocidura minuta* Otten and *Suncus murina* Linnaeus.—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1932. Vol. 21. No. 2. pp. 37-40. [16 refs.]

A long discussion on the questionable validity of the name "*Crocidura minuta*" proposed by OTTEN for a Javan shrew assumed to be new in 1917. *A. A.*

CUBONI (E.). Altre ricerche sull'azione tossica della lisocitina e del veleno dei serpenti.—*Boll. Istituto Sieroterap. Milanese*. 1932. Apr. Vol. 11. No. 4. pp. 264-270. German summary. [18 refs.]

HALL (Maurice C.). Parasitology in its Relation to Other Sciences.—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. June. Vol. 7. No. 4. pp. 405-416.

HENRY (Dora Priaulx). Allergy and Immunity in Coccidial Infections.—*Proc. Soc. Experim. Biol. & Med.* 1931. Vol. 28. pp. 831-832.

NAINGGOLAN (F. J.). Nogmaals over de giftigheid van *Naja bungarus* (N. hannah).—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. Mar. 1. Vol. 72. No. 5. pp. 307-308.

LEPROSY.

KOBAYASHI (Yutaka) & AMAGASAKI (Masao). **Statistical Observations of the Leprosy during 38 Years at the Tokyo Imperial University.**—*Japanese Jl. Dermat. & Urol.* 1932. May. Vol. 32. No. 5. [In Japanese pp. 389–401. With 1 chart. English summary pp. 49–50.]

It is over twenty years since the records of the lepers seen in the dermato-uological clinic of the Tokyo University have been studied. Those of the last 33 years from 1898 to 1930 show 6,693 lepers, or 2.98 per cent. of the total patients seen, with 3.4 times as many males as females. The percentage of lepers was always about 8 up to 1902, but since 1905 it has been only 2 to 3, and as the proportion of lepers among conscripts examined yearly shows no marked change in the last 15 years they conclude that "leprosy in Japan presents no tendency to decay." The ages 21–30 show the highest percentage of cases, namely 39.34; macular cases were 45.47 per cent., nerve 28.05, nodular 13.40, and mixed cases 9.11 per cent. The first signs were noted most frequently on the lower and upper extremities and on the face, and most rarely on the head, neck and nates; abnormal sensations and maculae were the earliest signs. Almost half the cases were in farmers, but this is only in proportion to their numbers.

L. Rogers.

MONIER (H. M.). Évolution d'un foyer de lèpre circonscrit dans la province de Cammon-Laos. [**Development of a Focus of Leprosy in Laos.**]—*Bull. Soc. Méd.-Chirurg. Indochine*, 1932. Apr. Vol. 10. No. 3. pp. 290–304. Also in *Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 606–617.

Twenty-five years ago 22 lepers were found in two villages in this area and five years ago the number known had increased to 145. A fresh enquiry has now been made and it is stated that the disease was originally introduced from Siam about 70 years ago. Malaria is very prevalent in the district, and among 324 inhabitants examined 43 definite cases and 8 suspected cases of leprosy have been seen, the nerve form predominating. Lepra bacilli were only found in the nasal secretions of 37 per cent. of 51 examined, and 5 times among 8 gland punctures. As the affected villages are isolated the author advises treatment of the cases with precautions against contagion, but compulsory segregation which is of little efficacy should be avoided.

L. R.

LODDER (J.). De lepra te Ambon. [**Leprosy in Amboina.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1932. Vol. 21. No. 1. pp. 41–47. English summary.

" 1. The frequency of leprosy has decreased in Amboina during the last nine years. It was 5.5 per thousand inhabitants in 1922 and 4.2 in 1931.

" 2. At present there are more lepers in Amboina than formerly, mainly because many of them have come from other islands to the Ambon leper-asylum.

" 3. Amongst 105 married couples, in which one of the partners showed leprosy, only in one case the other partner also was a leper.

" 4. 3.2 per cent. of the children of leprous fathers and 7.6 per cent. of the children of leprous mothers showed symptoms of leprosy.

" 5. The city of Ambon probably is the focus of the disease for the whole island. The differences of leprosy frequency between Mohametans and Christians and in various parts of the island may be explained in this way."

L. R.

LAQUIÈZE (E.). Enquête sur la lèpre aux îles de la Loyauté. [**Leprosy in the Loyalty Islands.**]—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 479-487.

———. La lèpre aux îles de la Loyauté.—*Ibid.* June 8. No. 6. pp. 618-625.

The results of this survey of the prevalence of leprosy in the Loyalty Islands are well summarized in the following table. The figures reveal an increase of leprosy in Lifou, but a fall in Mare Island as compared with previous estimates, but the incidence is still about 3 per cent. of definite cases, and double that figure if suspected cases are included. The percentage of affected women was 45 per cent. in Lifou and Ouvéa and no less than 73 per cent. of the total cases in Mare Island—a very high rate, which is attributed to the fact that morality does not exist and women do not know who are the fathers of their children. In two cases infants of two years were infected. Tuberculoid cases are not infrequent. The backwardness of the people makes prophylaxis very difficult, but isolation with treatment of bacteriologically positive

Progress of Leprosy in the Three Isles.

	Year	Popu- lation	Lepers	Per cent.	Sus- pects	Per cent.	Total per cent.
Investigation		Lifou.					
• Hébrard	1899		60 to 80	1.15 to 1.42			
„ Nicolas	1907-1908		73	1.26			
	1912	5,500	92	1.67			
	1919	5,002	102	3.09	154	2.61	5.70
„ Leboeuf-Javelly	1928	5,944	102	3.06	227	3.81	6.87
	1930	6,150	170	2.76	240	3.90	6.66
	1931	5,859	195	3.31	202	3.44	6.77
Investigation		Mare.					
Hébrard	1899		170	5.05	(Maximum percentage)		
„ Nicolas	1907-1908		106	3.2	(Minimum percentage)		
	1911-1912	3,400	180*	5.29			
	1929	3,233	90	2.75	69	2.75	5.50
„ Leboeuf-Javelly	1930	3,229	96	2.72	125	3.87	6.59
	1931	3,160	76	2.40	107	3.38	5.79
Investigation		Ouvéa.					
Hébrard	1899		30				
„ Nicolas	1907-1908		39				
„ Leboeuf-Javelly	1912	1,970	56	2.84			
	1931	1,999	58	2.90	76	3.80	6.70

*Approximate figure.

cases is carried out as far as possible, with good results especially in children, while education in elementary sanitation is attempted. Chaulmoogra esters are used in treatment with 5 per cent. guaiacol and this preparation is found to be painless and does not produce reactions.

L. R.

LAMPE (P. H. J.). De organisatie van de leprabestrijding in Suriname. [**Anti-Leprosy Measures in Dutch Gulana.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. May 24. Vol. 72. No. 11. pp. 710-720. With 4 figs. on 2 plates. English summary.]

On January 1st 1930 a new leprosy ordinance broke the old system of forced segregation by the police and replaced it by medical treatment of non-segregated lepers with the enforcement of precautionary measures to prevent infection, and segregation as a penalty for non-compliance with the regulations. Isolation did not last longer than was necessary on medical grounds, so the institute is now looked on as a hospital from which patients can be discharged to continue treatment at home. The organization includes in its work tracing lepers, treating unsegregated cases, control of patients obeying the medical rules and treatment of cases segregated in infirmaries. School children are examined regularly and those bacteriologically negative taught in a special school and positive cases treated at home or in asylums. There are 1,107 known lepers, of which 482 are isolated in three asylums, 249 attend regularly at the dispensary at Paramaribo and 195 are treated at their homes in the capital and in the districts.

L. R.

COPANARIS (Ph.). Les progrès effectués en Grèce pendant les deux dernières années dans la lutte contre la lèpre. [**Measures against Leprosy in Greece in the Last Two Years.**—*Bull. Office Internat. d'Hyg. Publique*. 1932. May. Vol. 24. No. 5. pp. 771-776.]

Twenty-five years ago EHLERS found 1,000 lepers in Crete alone, and segregation was commenced in Crete and at Samos and was followed by a decrease of the disease. In 1925 a further inquiry was made and nearly all the lepers discovered were isolated, and during the last two years further efforts resulted in the discovery of 27 new cases and the collection of some 200 into leprosaria for treatment. At the present time 549 are isolated in Crete, Athens, Samos and Chios, including 155 in an infectious hospital at Athens with a laboratory where treatment is carried out with Rogers' Alepol. Reactions occur and the results are very satisfactory.

L. R.

COCHRANE (R. G.). **A Survey of the Modern Development of Leprosy Work (1917-31), with an Appreciation of the Present Position.**—*Brit. Jl. Dermat. & Syph.* 1932. Mar. Vol. 44. No. 3 (No. 521). pp. 132-140. [23 refs.]

In this brief account of the well known recent history of leprosy work three periods are marked off, that up to 1916 or 1917, that from 1917 to 1931, and that after the international conference in 1931. A small, but rather important, chronological error has crept into the sentence: "The first work of Heiser, Mercado, Hollmann and Dean, followed up a year or two later by Rogers, on the discovery of preparations which

are capable of being given by injection." [A reference to the full account of the discovery of the modern methods of treatment will be found in ROGERS' Cameron Prize Lecture of October 1929, with 88 references, published in the *Edinburgh Medical Journal*; from this it will be seen that HOLLMANN and DEAN, in their important paper on the injection of chaulmoogra esters, published June 1919, acknowledged fully the earlier work of ROGERS published in 1916 and 1917 which established the value of the injection of soluble products of chaulmoogra oil. HEISER and MERCADO had previously injected the whole oil.]

L. R.

WADE (H. W.). **Demonstration of South African Tuberculoid Leprosy.**

—*Proc. Roy. Soc. Med.* 1932. May. Vol. 25. No. 7. pp. 1023–1027 (Sect. of Dermat. pp. 47–51). With 2 text figs.

The author found the tuberculoid type of macular leprosy unusually common in South Africa. It is characterized by a degree of infiltration raising the lesions abruptly above the surrounding skin, a rough granular surface and on microscopic examination lepra bacilli are very scarce, but giant cells resembling those of tuberculosis are met with. Two illustrations of the appearance of the lesions are included. L. R.

SOULAGE & NADESSIN. Lèpre cutanée éruptive varicelliforme. [**Varicelliform Eruption in Leprosy.**]—*Rev. Méd. et Hyg. Trop.* 1932. Mar.–Apr. Vol. 24. No. 2. pp. 102–106. With 2 text figs.

A case of leprosy is described in which numerous vesicles about the size of a lentil appeared on the body, and on microscopical examination they showed numerous acid-fast bacilli, which were also found in the nasal secretion. L. R.

BARRETT (J. W.). **Paralysis of the Lower Eyelid due to Leprosy.** [Correspondence.]—*Med. Jl. Australia.* 1932. July 30. 19th Year. Vol. 2. No. 5. p. 155.

The writer reports that in Honolulu isolated paralysis of the lower eyelid, due to affection of facial nerve fibres, is common. On the other hand he has never seen involvement of the intrinsic muscles of the eye in leprosy. L. R.

MUIR (E.) & CHATTERJI (S. N.). **The Infection of Stratified Epithelium in Leprosy.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1163–1164. With 4 figs. (2 coloured) on 3 plates

The authors report a case of suspected ichthyosis in which skin clips revealed numerous lepra bacilli and sections showed numerous similar bacilli in the more superficial parts of the corium. Superficial scrapings of the epithelium from various parts of the body also occasionally showed numerous acid-fast bacilli, so that the organisms must have been frequently shed from the unbroken skin. Scrapings in several other patients with intact epithelium have yielded similar findings, so the possibility of infection in the absence of ulceration of the skin must be recognized. L. R.

LEGER (Marcel). Procédé commode de mise en évidence des bacilles de la lèpre. [**Convenient Procedure for demonstrating Lepra Bacilli.**—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 546-549.

The author points out that the "clip-method" for detecting lepra bacilli in the skin recently described by LOWE and CHRISTIAN is practically identical with that described by Leger in his article on leprosy in CARNOT & LEREBOUTET'S Treatise of Medicine. In his plan a small triangular piece of tissue, not extending into the subcutaneous tissues, is dissected up and its under surface applied to a clean slide, after which the piece of tissue is replaced and heals without leaving even a superficial wound. L. R.

SARDJITO (M.) & SITANALA (J. B.). [In Dutch & English.] Het aantoonen van leprabacillen in het bloed door middel van de dikkedruppelmethode. **The Demonstration of Lepra Bacilli in the Blood by Means of the Thick Drop Method.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1932. Vol. 21. No. 2. In Dutch pp. 27-32. In English pp. 32-37. With 6 figs. on 1 plate.

The authors have confirmed the possibility of finding lepra bacilli in the blood of lepers by the thick drop method, as used in malaria, and, after dehaemoglobinization and drying, staining with the Ziehl-Neelsen method. The blood was taken from a healthy looking finger after cleaning with ether and alcohol. In 33 untreated patients the nasal secretion gave 26, irritation serum 25 and blood drops 25 positive results, and in 19 treated ones the figures were 12, 12 and 15 respectively. Out of 129 apparently healthy house-mates of lepers the nasal secretion was positive in 4, irritation serum in 1 and blood drops in 6, and they give reasons for considering that there is the highest probability that these acid-fast bacilli were lepra. The morphology of the bacilli varied greatly from globi consisting of masses of bacilli to separate rods and cocco-bacilli. These are illustrated by micro-photos. L. R.

MONTEL (M. L. R.). Quelques considérations sur le traitement de la lèpre. [**Treatment of Leprosy.**—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 404-410.

The author records his experience in Saigon in the treatment of leprosy which he holds cannot now be considered incurable, if chaulmoogra preparations are injected over a long period. In early cases with the first lesions clinical cure can be obtained, and in generalized cases either disappearance of the symptoms or their great amelioration may result. Pilules of chaulmoogra soaps can also be used orally with benefit, but should be supplemented by injections of collobiase chaulmoogra. L. R.

POTTIER (R.). Note au sujet des médicaments dérivés de l'huile de chaulmoogra, utilisés contre la lèpre. [**Derivatives of Chaulmoogra Oil in Leprosy.**—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 143-145.

In this short paper the author states his preference for chaulmoogra esters, with either $\frac{1}{2}$ per cent. iodine or 10 per cent. creosote, from the point of view of tolerance, but he advises that the soaps should also be tried. L. R.

RAO (G. Raghunatha). **Studies on Serum Proteins in Leprosy, with Special Reference to Hydnocarpus Treatment.**—*Indian J. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 993–1011. With 2 graphs.

In reviewing papers on the increase in the serum-globulin in lepers ROGERS suggested that the simple formol-gel test might possibly prove of diagnostic value, so the author has studied the serum proteins in 252 cases of leprosy, with 56 controls, with special reference to hydnocarpus treatment. He found a significant reduction in serum albumin and increase in serum globulin in all types of lepers and in untreated ones, and a marked increase of the globulin value follows an injection of any hydnocarpus preparation. On the other hand the formaldehyde test in uncomplicated leprosy is never positive and there is no definite relationship between formalin coagulation and serum globulin in lepers or lepra reaction. L. R.

NOLASCO (J. O.). **Lymphatic Absorption of only Antileprotic Drugs, given Intradermally and Subcutaneously ; a Demonstration.**—*Jl. Philippine Islands Med. Assoc.* 1932. Apr. Vol. 12. No. 4. pp. 147–159. With 4 text figs. [17 refs.]

Experiments to establish the route of absorption of chaulmoogra oil and ester subcutaneous and intradermal injections were carried out in four monkeys with control injections of salt solution in the opposite limbs. After death from tuberculosis in one and sacrifice of the other animals, microscopic examinations of the tissues were made and the sections stained to show the absorption of the fatty substances injected at intervals of 7 to 16 days during the previous five weeks. It was found that the injected oily substances were absorbed by the lymphatics where they would come into direct contact with the lepra bacilli. The intradermal method caused greater fatty infiltration of the corium than did the subcutaneous, so the former appears to be preferable. The iodized ethyl esters caused more cellular infiltration of the injected skin than the oil, so the former is more active. The drug was found in the lymphatic glands and also in large mononuclear cells in the lungs, and more rarely in the spleen, but not in the liver or kidneys. The ulnar and median nerve trunks were unaffected by injections of the drug into the forearm. L. R.

BHANDARI (Amba Datt). **Alepol in the Treatment of Leprosy.**—*Indian Med Gaz.* 1932. May. Vol. 67. No. 5. pp. 244–246.

The author reports that as the result of a year's trial of alepol intramuscularly and subcutaneously at a leprosy clinic he has found it to be well tolerated and to cause less irritation than E.C.C.O. and other hydnocarpus preparations, while it is comparatively cheaper. L. R.

STEIN (A. A.). **Zur Therapie der Lepra. [Treatment of Leprosy.]**—*Dermat. Ztschr.* 1932. May. Vol. 63. No. 6. pp. 393–401.

This paper deals with the local and temperature reactions in the course of the treatment of leprosy. Such exacerbations come on quite suddenly with inflammatory appearances in the skin lesions and nerve pains, swelling of the lymphatic glands and fever with temperature rises up to 39–40°C. and sometimes the appearance of new skin lesions,

and they are commonly followed by clinical improvement. They are relieved by the intravenous injection of tartar emetic in doses of 1-5 cc. of a one per cent. solution every two days, with rapid subsidence of the local and febrile reactions. On the other hand in stationary cases of leprosy antimony had no effect, nor does its use protect against the recurrence of exacerbations. *L. R.*

STEIN (A. A.). [**Antimony Treatment of Exacerbations in Leprosy.**]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 9. pp. 442-446. [In Russian. French summary.]

The author employed 1 per cent. tartar emetic intravenously in doses of 1 to 5 cc. every other day for the treatment of exacerbations in leprosy. The exacerbations dealt with were characterized as follows: increase of the inflammatory processes in existing nodules, appearance of new nodules, rise of temperature to 40°C., and other minor symptoms. Antimony treatment causes a rapid fall in the temperature, a sharp diminution of the inflammation of the nodules and a gradual disappearance of the new ones. It is effective only in acute cases, but does not protect from recurrences of exacerbations. *C. A. Hoare.*

ADANT (M.). Au sujet de la réaction de Rubino. [**Rubino's Reaction.**]—*C. R. Soc. Biol.* 1932. May 20. Vol. 110. No. 17. pp. 119-120.

The author has used Rubino's test, which consists in the sedimentation of haemolysed sheep's red corpuscles by the serum of a leper, and he has confirmed Rubino's finding that non-specific reactions under the influence of hetero-agglutinins in the non-leprous can be avoided by their previous absorption by non-formalized red corpuscles. *L. R.*

LÉPINE (P.), MARKIANOS (J.) & PAPAYOANNOU (A.). Valeur pratique de la réaction de Rubino pour le sérodiagnostic de la lèpre. [**Practical Value of Rubino's Reaction in the Serodiagnosis of Leprosy.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 543-546.

These workers also confirm the specific value of Rubino's test used with the absorption of hetero-agglutinins when necessary. They have studied its degree of sensibility in different stages of the disease with the result that in first stage cases only 50 per cent. were positive against 70 to 77 per cent. in the second and third stages. Further positive reactions were obtained in 12.5 per cent. of nerve, 35 of mixed, 14 in early macular and 70 per cent. of nodular cases. The positive cases were well marked clinically, so its diagnostic value is very limited. *L. R.*

COWAN (T. A.). **The Wasserman Reaction in Leprosy.**—*Malayan Med. Jl.* 1932. June. Vol. 7. No. 2. pp. 46-48.

The claim of KOLMER that his modification of the Wassermann test does not give falsely positive reactions in non-syphilitic lepers has been tested in 593 Malay Asylum lepers showing no signs of syphilis and in 444 non-leper controls. Anticomplementary cases amounted to 3.8 per cent. in advanced lepers, 1.1 per cent. in others and 1 per cent. in controls, and they were excluded. In the remainder the Kolmer test gave positive reactions in 35.9 per cent. of the controls, 31.5 of early

cutaneous and mixed cases, 30·7 in pure nerve cases other than the advanced ones, 38·5 in moderately advanced cases and advanced nerve ones and 53·9 per cent. of advanced cutaneous and mixed cases, so the test is not very reliable in the last mentioned class. *L. R.*

PINOY (E. P.) & FABIANI (G.). Essai négatif d'inoculation de la lèpre chez un singe splénectomisé. [**Negative Result of Inoculation of Leprosy into a Splenectomized Monkey.**]—*C. R. Soc. Biol.* 1932. June 17. Vol. 110. No. 21. pp. 489-490.

A monkey, *Macacus inuus*, was splenectomized with a view to decrease its resisting power, and then inoculated intraperitoneally with the juice obtained by puncturing an inguinal gland of a leper. The result was negative. *L. R.*

WATANABE (Yoshimasa), HARASAWA (Jinsai) & ONO (Isamu). **On the Isolation of Acid-fast Bacilli from the Leprous Nodules and Animal Experiments.**—*Kitasato Arch. Experim. Med.* 1931. July. Vol. 8. No. 3. pp. 303-313.

After brief reference to some former attempts to cultivate the lepra bacillus these authors report that after many years work at the subject they succeeded in obtaining pure cultures of two acid-fast bacilli. One gave a brownish-yellow colony like that described by CLEGG, and the other a pale colony resembling the colonies of tubercle bacilli described by KEDROWSKY. Yolk of egg agar was the most successful culture medium in the case of the brownish-yellow colonies, and inoculation into rats and guineapigs gave negative results, so they are doubtful whether it is the lepra bacillus or only a contamination. The pale colonies grew only in a vegetable soup made with Japanese carrots, and subcultures could only be made after incubation for over two weeks. The organisms could be stained with Ziehl-Neelsen or gentian violet and they were gram positive. Inoculation of guineapigs and mice gave negative results, but in a Japanese monkey nodules which ulcerated formed at the three sites of inoculation; subcultures, however, were not successful. On inoculating the monkey with tuberculin allergy was obtained. They do not think that the pale colonies can be considered to be lepra bacilli because the percentage of cultivation was very small and animal experiments were negative. *L. R.*

JAME (L.), JACOB (A.) & JUDE (A.). Lèpre mixte à évolution aiguë. (Présentation de malade.)—*Rev. Méd. et Hyg. Trop.* 1932. May-June. Vol. 24. No. 3. pp. 149-153. With 2 figs.

MONTAÑÉS (Pablo). La reacción de Rubino en la lepra. Su valor diagnóstico.—*Rev. Sanidad e Hig. Pública.* 1932. Jan. Vol. 7. No. 1. pp. 1-25. With 7 diagrams. [15 refs.]

TANCREDI (Antonio). Ricerche sopra il sangue di lebbrosi prima e dopo la cura Simonini.—*Arch. Ital. Sci. Med. Colon.* 1932. July 1. Vol. 13. No. 7. pp. 393-417. With 2 figs. & 2 coloured plates. [42 refs.] English summary (6 lines).

MEDICAL ZOOLOGY.

VENOMOUS SNAKES AND SNAKE VENOMS.

1. *Snake-venom and Snakebite*.—KELLAWAY¹ describes the effects of the certainly lethal dose of the venom of the Common Australian Brown Snake, *Demansia* [sic] *textilis*, for an extensive series of laboratory animals. The venom although highly potent is somewhat inferior to that of the Tiger Snake; it is powerfully neurotoxic, little haemolytic, and its thrombin component is very potent both *in vivo* and *in vitro*. The amount of the venom-yield and the skeletal biting-mechanism are not ideally effective for the destruction of man.

HARA² reports his experimental studies of biochemical changes in the blood and of the histopathology of the skin caused by the haemorrhagic venoms of three Formosan snakes—*Lachesis gramineus* and *mucrosquamatus* and *Ancistrodon acutus*. He concludes that the haemorrhage caused by them is due to destruction of the vascular endothelium and not directly to changes in the blood, and also that the ultimate anaemia is both haemorrhagic and toxic.

ISWARIAH and DAVID³ go into the pharmacological effects of the venom of the Oriental *Vipera Russellii*. They conclude that the general fall of blood-pressure caused by it in mammals is probably due to paralysis of the capillaries; that it does not seem to have any direct action upon the heart or the walls of the bloodvessels; they observe that intravenous administration of normal saline in 10 to 15 cc. doses tends to revive the animal, the heart working well for a long time afterwards; and they do not find any evidence that the venom increases the coagulability of the blood, or that haemolysis is caused by any concentration likely to be found in the human system after a bite from a viper.

Treatment of Snakebite.—The excellent dissertation by KELLAWAY and MORGAN⁴ on the treatment of snakebite in Australia may be regarded as the practical outcome of the revival of research started mainly by FAIRLEY and KELLAWAY and already noticed in this *Bulletin* for 1929 (Vol. 26, pp. 770–776). For the rational treatment of snakebite Australia is now restored to its proper place in the front line.

Other papers on treatment are not of any special interest. MANON⁵ includes details of two cases of viper-bite in Europe in a general review

¹ KELLAWAY (C. H.). Observations on the Certainly Lethal Dose of the Venom of the Common Brown Snake (*Demansia textilis*) for the Common Laboratory Animals.—*Med. Jt. Australia*. 1931. Dec. 12. 18th Year. Vol. 2 No. 24. pp. 747–751.

² HARA (Y.). Experimental Studies on the Poisons of Formosan Snakes. (3rd Report.) On the Patho-Histological Changes of the Skin caused by the Poisons. (4th Report.) On the Origin of the Haemorrhage caused by the Haemorrhagic Poisons. (5th Report.) On the Origin of the Anaemia caused by the Haemorrhagic Poisons.—*Taiwan Igakkai Zasshi* [*Jl. Med. Assoc. Formosa*]. 1932. Apr. Vol. 31. No. 4 (325). [In Japanese. English summaries pp. 45–46.]

³ ISWARIAH (V.) & DAVID (J. Christodoss.) The Pharmacological Action of the Venom of Russell's Viper of India (Daboia or *Vipera elegans*).—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1035–1040. With 6 figs.

⁴ KELLAWAY (C. H.) & MORGAN (F. G.). The Treatment of Snake-Bite in Australia.—*Med. Jt. Australia*. 1931. Oct. 17. 18th Year. Vol. 2. No. 16. pp. 482–485.

⁵ MANON. Deux cas de piqûre de vipère. Etude sur les piqûres des reptiles venimeux en général.—*Jl. Méd. de Bordeaux*. 1932. May 10. Vol. 109. No. 13. pp. 369–375. With 15 figs.

on venomous reptiles. GHARPUREY⁶ in recalling some recorded cases of treated bites from krait, cobra, and *Echis carinatus*, calls attention to the fact that the bite of the harmless *Lycodon aulicus*—a common Indian snake that is often mistaken for a krait—may evoke some transient local irritation. KOPSTEIN⁷ describes *Bungarus javanicus* as a new species of krait from Java, its effective bite being quickly fatal, with dyspnoea as the urgent symptom. There only remains to mention a paper by SEAL⁸ on cases in Bengal of what the author calls progressive peripheral neuritis following snakebite. In the accounts of these cases the mention of a tight ligature applied as a "first aid measure" and kept in place for many hours has an ominous significance.

2. *Immunology*.—Experiments by GUNN and HEATHCOTE (see this *Bulletin*, 1921, Vol. 18, p. 31) were interpreted by those workers as evidence that both the *natural* resistance and the *acquired* immunity of the cat to cobra-venom are due, at least in part, to the activity of the animal's tissue-cells. The experiments now recorded by KELLAWAY and WILLIAMS⁹ although to a certain extent considered confirmatory of that interpretation are held to be inconclusive evidence as to *acquired* cellular immunity, these authors having no faith in the acquirement of immunity by the tissues apart from that conferred by the presence of antitoxic antibody in the tissue-cells or the intercellular spaces.

Investigations by IWASE¹⁰ of the immunizing properties of the anti-venomous sera of five species of Formosan thanatophidia—namely *Lachesis mucrosquamatus*, *L. gramineus*, *Ancistrodon acutus*, *Naja naja atra*, and *Bungarus multicinctus*—possess some interest, and the following results are published in the German summary of that author's paper. Antimucrosquamatus serum could partly neutralize the Bungarus venom, but antigramineus serum could not do so; conversely the antibungarus serum can to a certain—if small—extent neutralize *Lachesis mucrosquamatus* and *L. gramineus* venom. Polyvalent serum against the venom of *Ancistrodon acutus* and *Lachesis mucrosquamatus* and *gramineus* can immunize animals against the venoms of *A. acutus* and *L. mucrosquamatus* and contains a sufficiency of antitoxin against *L. gramineus* venom. The polyvalent serum against venom of *Naja naja atra* and *Bungarus multicinctus* is of great consequence practically but has no peculiar immunological interest. The venoms of the three viperid species have certain properties in common, those of the two colubrine species have not. A somewhat similar paper by

⁶ GHARPUREY (K. G.). Some Snake-Bite Cases.—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. pp. 81–82.

⁷ KOPSTEIN (Felix). *Bungarus javanicus*, een nieuwe Javaansche giftslang. Mededeeling over een doodelijke Bungarus-beet.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1932. Feb. 2. Vol. 72 No. 3. pp. 136–139. With 1 fig. & 1 plate.

⁸ SEAL (S. C.). Snake Bite and Neuritis.—*Calcutta Med. Jl.* 1931. Nov. Vol. 26. No. 5. pp. 185–195.

⁹ KELLAWAY (C. H.) & WILLIAMS (F. Eleanor). Some Observations on Cellular Immunity to Snake Venom.—*Jl. Path. & Bact.* 1932. Mar. Vol. 35. No. 2. pp. 193–197.

¹⁰ IWASE (Y.). Immunologische Untersuchungen ueber die wichtigeren Schlangengifte in Formosa. I. Bericht: Quantitative Beziehungen zwischen den Schlangengiften und Immunseren. II. Bericht: Immunologisch gemeinschaftliche Eigenschaften der Schlangengifte.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1931. Dec. Vol. 30. No. 12 (321). [In Japanese. German summaries pp. 93–95.]

SCHLOSSBERGER and MENK¹¹ on the extra-specific valency of anti-venomous sera is mostly ratiocinatory; its experimental contribution is summarized in 3 tables which record the neutralizing effect of definite quanta of several of the standard antivenomous snake-serums on definite quanta of the venoms of certain species of European vipers—in admixture and injected into mice.

MADAME PHISALIX and F. PASTEUR¹² describe the technique and the experiments which lead them to the conclusions that the infra-red rays like the ultra-violet rays do not modify the global toxicity of viper-venom, but that they only partially destroy its venom-antigen (slightly diminishing its vaccinating action) which the ultra-violet rays destroy completely. MADAME PHISALIX¹³ under the subheadings "Vaccination against viper-venom by means of bee-venom" and "Vaccination against bee-venom by means of viper-venom" describes her experiments which confirm and verify those of C. PHISALIX (*C. R. Soc. Biol.* 1897, Vol. 49, p. 1031) demonstrating the antagonism between the venom of the Vespidae and that of the viper, the former imparting some amount of immunity against the latter. See also on this reciprocal phenomenon *C. R. Acad. Sci.* 1904, Vol. 139, p. 326, "Researches on Venom of Bees."

3. *Anavenins and Paravenins*.—The excellent series of papers by ARTHUS on Anavenins has been noticed elsewhere in this *Bulletin* (Vol. 28, pp. 549, 550; and Vol. 29, pp. 161, 492). We may, however, invite attention to the sixth instalment¹⁴ of the series, which deals briefly with paravenins or solutions of snake-venom neutralized not by treatment with formaldehyde but by treatment with 2 per cent. chloride of lime. A 1 per cent. solution of cobra-venom so treated is neutralized "practically instantaneously" (although about $\frac{1}{10}$ th part of the venom remains for an indefinite time unaltered); all its toxic properties, paralytic, anticoagulant, and proteolytic, are suppressed. So too is it with the venoms of *Crotalus adamantus* and *Lachesis lanceolatus* similarly chlorinized. Therefore, as CALMETTE has stated, venomous snakebite may well be treated by injection of the appropriate paravenin into the vicinity of the bite, but not into any other part of the body.

A. Alcock.

MALLICK (S. M. K.) & MAITRA (G. C.). On the Distribution of Protective Principle in Different Protein Fractions of Horse Serum immunized against Snake Venom.—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 951-955. [10 refs.].

¹¹ SCHLOSSBERGER (H.) & MENK (W.). Experimentelle Untersuchungen ueber die Serumbehandlung der Bisse europäischer Giftschlangen.—Reprinted from *Festschrift für Prof. Dr. Emil Bürgi, Bern.* 1932. p. 296. [11 refs.] in *Arb. a. d. Reichsgsndhtsamt.* 1932. May. Vol. 56. No. 1. pp. 1-11.

¹² PHISALIX & PASTEUR (F.). Les rayons infra-rouges ne modifient pas la toxicité globale du venin de la vipère aspic, mais en diminuent légèrement l'action vaccinante.—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 320-322.

¹³ PHISALIX. Action vaccinante réciproque des venins d'abeille et de vipère aspic.—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 581-584.

¹⁴ ARTHUS (Maurice). Les anavenins (sixième mémoire). Destruction de la toxicité des venins par le chlorure de chaux. [The Anavenins (Part 6). Destruction of the Toxicity of Venoms by Chloride of Lime.]—*Jl. Physiol. et Path. Gén.* 1931. Dec. Vol. 29. No. 4. pp. 705-716.

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XVIII.*

CONJUNCTIVA.—*Plasmoma of the conjunctiva* is a condition which, possibly, may sometimes escape recognition in trachomatous countries. SOUDAKOFF¹ has presented a careful clinical and histological account of the disease based on the study of seventeen cases amongst Chinese patients of varying age and class. The disease had a gradual onset. A small reddish granular mass appeared, most frequently in the plica semilunaris, but sometimes in the retrotarsal fold. Multiple masses might closely resemble trachomatous follicles. Adjacent masses coalesce and have a yellowish-red waxy appearance with a smooth surface and a firm consistency. The surface may become lobulated and these lobules are smooth and pale with an absence of blood-vessels and are unaccompanied by any discharge. Histologically there is a diffuse infiltration of plasma cells which begins just beneath the epithelium; hyaline degeneration of the connective tissue stroma can be detected in most cases. Plasmoma is not a tumour but a reaction to a chronic irritant. The author believes that trachoma plays an important part in the development of the disease. Prolonged action of the toxin irritant may lead to advanced hyaline and amyloid degeneration of the connective tissue. Early and complete excision of the growth followed by radium treatment are the measures recommended for cure.

Another form of conjunctival inflammation likely to be confused with trachoma is described by KELLER² who met with it in Saigon. The palpebral conjunctiva is much thickened and papillary formation is marked. There is considerable engorgement of the vessels of both bulbar and tarsal conjunctiva, and chemosis is often present. With suitable treatment resolution occurs without any cicatrization in about three weeks. Corneal ulcers may form occasionally. The disease always first attacks the tarsal conjunctiva of the lower lid and may remain limited to one eye, differing from trachoma in these respects. Lachrymation is profuse, but there is no mucopurulent discharge. Great care should be exercised to avoid the use of any irritating applications in the early stages of the disease. Once the swelling has subsided sulphate of zinc and atropine are useful. The inflammation appears to be contagious, but no organism has been isolated. The disease rather resembles swimming-bath conjunctivitis, but has no connection with bathing.

Trachoma.—TIROUVANZIAM & LÊ-VAN-XUYÊN³ have remarked that, though trachoma is widespread in Indo-China, Cambodia is relatively free from the disease. The province of Kampot is, however, heavily infected. This is due to the constant influx of trachomatous immigrants from China. The sufferers take little care of themselves and the disease spreads. The authors describe their methods of

* For the seventeenth of this series see Vol. 29, pp. 434-440.

¹ SOUDAKOFF (P. S.). *Plasmoma of the Conjunctiva in China.*—*China Med. J.* 1930. Mar. Vol. 44. No. 3. pp. 195-225. With 14 figs. (1 coloured) on 7 plates. [56 refs.]

² KELLER (P.). Contribution à l'étude d'une nouvelle forme de conjonctivite : la conjonctivite hypertrophique.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1932. Apr. Vol. 10. No. 3. pp. 305-313.

³ TIROUVANZIAM & LÊ-VAN-XUYÊN. Le trachome à Kampot.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1931. Nov.-Dec. Vol. 9. No. 10. pp. 789-794.

treatment which are those in common use. CORNET⁴ has found tracholysine to be excellent in the treatment of the disease, especially in its early stage. He claims that it is painless and can be used in association with other measures.

In the *Revue Internationale du Trachome* for April 1932 SANTONASTASO⁵ describes degenerative changes in the tarsal conjunctiva of the lower lid and in the bulbar conjunctiva which he believes were caused by trachoma. GABRIÉLIDÈS⁶ reviews the knowledge of trachoma possessed by the ancient Greeks. A perusal of his paper is calculated to increase one's admiration for that people. Thus ARISTOTLE recognized that a sound knowledge of the workings of the body in health and disease was required of any person who attempted to cure diseases of the eye. GALEN thought that trachoma could originate not only from evil humours in the body or from the use of irritating applications, but also from ordinary sources of conjunctival inflammation such as dust, smoke, irritating vapours, etc.

WRIGHT⁷ has found the use of a contact glass helpful in maintaining a conjunctival flap or graft in the desired position on the cornea. He has reported a very satisfactory result in the case of a corneal fistula which followed an ulcer in the pupillary area. Thin epithelial grafts, taken from the arm, and applied under the protection of a contact glass also gave excellent results.

Cataract.—A paper by ELLIOT⁸ is full of practical hints regarding the management of cataract cases. He does not hesitate to operate on a mature uncomplicated cataract when the other eye has normal vision, since he considers that the advantages of so doing outweigh any disadvantages. He prefers usually to perform a preliminary iridectomy and about a month later to extract the cataract under a bridge-flap of conjunctiva. A central piece of the anterior layer of the capsule is excised with a Bowman's needle before making the section; after the lens has been delivered cortical matter is washed out of the chamber and the toilet of the wound is completed by a stream of normal saline solution. [It may be noted that this author was the first to apply the use of McKeown's irrigation of immature cataracts in the ordinary operation and to develop it.] The paper is largely concerned with European practice, but will nevertheless prove of much service to the surgeon working in the Tropics. JAMAL-UD-DIN⁹ has recorded some notes on his experience of cataract in the Punjab. Smith's intracapsular operation is that most often performed, and a corneal incision is favoured. The after-treatment includes complete rest in bed

⁴ CORNET (Emmanuel). Deux cas de trachome cliniquement guéris par injections sous-conjonctivales palpébrales de tracholysine d'Angellucci.—*Bull. Soc. Méd.-Chirurg. Indochine*. 1931. Nov.-Dec. Vol. 9. No. 10. pp. 813-815.

⁵ SANTONASTASO (A.). Contributo allo studi del tracoma come causa di degenerazione dei tessuti attaccati.—*Rev. Internat. du Trachome*. 1932. Apr. Vol. 9. No. 2. pp. 67-83. With 5 figs. French summary.

⁶ GABRIÉLIDÈS (A.). Du trachome et du trichiasis chez les anciens Grecs.—*Rev. Internat. du Trachome*. 1932. Apr. Vol. 9. No. 2. pp. 95-112. [39 refs.]

⁷ WRIGHT (R. E.). The Contact Glass as an Aid in Corneal Plastic Surgery.—*Brit. J. Ophthalm.* 1932. Aug. Vol. 16. No. 8. pp. 473-475.

⁸ ELLIOT (R. H.). Cataract.—*Practitioner*. 1932. May. Vol. 128. No. 5. pp. 481-492. [10 refs.]

⁹ JAMAL-UD-DIN. Notes on Cataract in the Punjab.—*Indian Med. Gaz.* 1932. July. Vol. 67. No. 7. pp. 386-387.

for a period of from seven to ten days. The author prefers to leave the dressings undisturbed until the tenth day ; but he admits that such restriction may not be essential to success.

UBALDO and AYUYAO¹⁰ found that cataract accounted for seventeen per cent. of the 3,748 patients who attended the Eye Department of the Philippine General Hospital during ten years. The labouring class seemed to show a higher incidence of the disease than the well-to-do, a difference in nutrition being possibly the determining factor. Intra-capsular extraction was the operation performed on all the senile cataracts. The rate of vitreous escape was approximately ten per cent. and of intraocular haemorrhage one per cent. The occurrence of vitreous opacities after operation was somewhat frequent. The authors believe that disuse of the eye owing to delay in seeking relief prejudices the prospect of recovering good vision ; and better results are likely when patients become sufficiently enlightened to seek aid earlier.

Quinine Poisoning.—ROQUES¹¹ has reported a case of quinine amblyopia. The patient was a youth who claimed to have swallowed twenty-two and a half grams of quinine. Deafness and blindness followed. The pupils were dilated and inactive and the vision was reduced to perception of light. The optic disc was blanched and the fundus reflex grey with a rose coloured area in the macular region whilst the retinal arteries appeared shrunken. Central vision recovered to 9·10 after the lapse of a month and a half, but the visual field remained concentrically contracted. Pallor of the disc and a sluggish pupil reaction also persisted. The ophthalmoscopic picture during the active stage closely resembled that of an obstruction of the central artery of the retina, but in this case both eyes were affected and the discs were more blanched than in the latter condition.

Filariasis.—Koman NAYAR & Kandaswami PILLAI¹² have reported a case of a filarial worm in the eye and believe the invader to have been an adult *F. bancrofti*. The patient came from a district in which filariasis is prevalent and his blood contained microfilariae bancrofti ; the worm, too, when seen in the anterior chamber, resembled *F. bancrofti*. When first seen the parasite lay wriggling in the vitreous, one extremity being attached to a small clot of blood in the neighbourhood of the macula. During a railway journey of about 400 miles to Madras the patient was conscious of red and green sparks passing in front of his eye and on arrival at his destination the worm had disappeared. Five days later it reappeared and was found lying at the bottom of the anterior chamber from which it was evacuated but was unfortunately lost in the gush of aqueous. It should be noted that any bright light thrown on the worm during examination rendered it restless and uneasy.

Leprosy.—BARRETT¹³ has drawn attention to the paralysis of the lower eyelid which is not uncommonly found in the comparatively

¹⁰ UBALDO (A. R.) & AYUYAO (C. D.). Cataract among Filipinos.—*Jl. Philippine Islands Med. Assoc.* 1932. Apr. Vol. 12. No. 4. pp. 160-163.

¹¹ ROQUES (Paul). Troubles oculaires consécutifs à une intoxication par la quinine.—*Marseille-Méd.* 1931. Nov. 25. Vol. 68. No. 33. pp. 675-677.

¹² NAYAR (K. Koman) & PILLAI (A. Kandaswami). A Case of Filariasis Oculi.—*Brit. Jl. Ophthalm.* 1932. Sept. Vol. 16. No. 9. pp. 549-551.

¹³ BARRETT (J. W.). Paralysis of the Lower Eyelid due to Leprosy. [Correspondence].—*Med. Jl. Australia.* 1932. July 30. 19th Year. Vol. 2. No. 5. p. 155.

early stages of leprosy. The facial nerve may be involved either as a whole or in its various terminal branches.

The Annual Report of the Madras Government Ophthalmic Hospital for the year 1931¹⁴ is rather a special number since, unfortunately, it is likely to be the last to be issued by the Superintendent, Lt.-Col. R. E. WRIGHT, as he is leaving India on his retirement. He has furnished a very comprehensive account of the Hospital and its activities. The Institution has now reached a very considerable size and deals with nearly four thousand in-patients and twenty-nine thousand out-patients annually. The daily attendance of out-patients exceeds 300, and operations on in-patients amount to nearly 3,600 (1,816 being for senile cataract). Post-graduate training, too, is actively pursued in this well-equipped school. The record of Wright's great experience in cataract extraction is extremely valuable. Regarding technique he remarks "Every case is a law unto itself, and one must be quick to appreciate how to vary procedure according to the nature of the case, and to anticipate probable trouble during the convalescence." A tendency to ocular hyperaemia is common in Madras patients and this often causes bleeding to occur into the anterior chamber, with consequent complications, when a "bridge-flap" is fashioned. An open mind is preserved on the question of capsulotomy or intra-capsular extraction. Barraquer's phakoerisis was the variety of intra-capsular operation most often performed (193 eyes); but over eighty per cent. of the extractions were by capsulotomy and the majority of these had a peripheral iridectomy. Vitreous escape occurred in 1.25 per cent. and iris prolapse in 0.66 per cent. These figures are remarkably low since different surgeons of varying experience were responsible. As regards the cause of glaucoma secondary to a hypermature cataract Wright considers that the increased tension may be due (1) to a simple swelling of the lens; (2) to irritation by the morgagnian fluid; (3) to a combination of both these causes. Superficial punctate keratitis continued in epidemic form during the year, and the Superintendent is able to give an exceptionally accurate description of the symptoms since he contracted the disease himself. Fortunately the attack was a mild one. Many cases of interest are recorded, and the report provides information and statistics regarding the incidence of eye disease in the Tropics which are of great value to all ophthalmic surgeons and investigators.

H. Kirkpatrick.

¹⁴ MADRAS. Administration Report, Statistics and Professional Report of the Government Ophthalmic Hospital Madras, for the Year 1931 [WRIGHT (R. E.), Supt.].—54 pp. 1932. Madras.

TROPICAL DERMATOLOGY.

TEDESCHI (Carlo). Casi di dermatite polimorfa epidemica da miceti in territorio di Derna. [**Outbreak of Dermatitis of Fungal Origin in Derna (Cyrenaica).**]—*Arch. Ital. Sci. Med. Colon.* 1932. Feb. 1. Vol. 13. No. 2. pp. 72-93. With 18 text figs. English summary (7 lines).

During the period August 1930 to the spring of 1931 the author observed several patients affected with what was believed to be scabies. They had more or less associated with camels and there is a variety of sarcoptes common on camels. He, however, failed to find them on these patients, but from lesions in man and also in camels, horses, and Abyssinian mules he was able to isolate and cultivate a species of mould belonging to the Mucoraceae. In animals he saw the condition only in those which were in a poor state from bad diet with deficient vitamins. In man the lesions were of a pruriginous character, with branny desquamation, or with miliary eruption, in severe cases papulo-pustular. They were common on the legs, abdomen, neck and shoulders. Experimentally, the author could not reproduce the disease by applying a culture to the skin of healthy animals—horse, ass, goat, sheep, dog or cat—probably, he thinks, because they were well nourished. He succeeded, however, in producing a papulo-pustular lesion in one case, a scabby crusted lesion in a second in horses after treating the skin with (?) emery paper (carta vetrata) and obtained a growth again from these lesions. [This is not altogether conclusive; might it not be mere growth of an implanted mould on a wound?]

H. H. S.

CATANEI (A.). Recherches sur les teignes dans quelques agglomérations de la côte orientale de l'Algérie. [**Incidence of Ringworm in Population of Eastern Coast of Algeria.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 101-106.

Work carried out in May 1931 in the six chief ports and fishing villages. Among 2,554 children, 113 showed trichophytic infections of the scalp and 58 suffered from favus. The great majority occurred in natives, 14 only being seen in children of European or Jewish stock. The actual percentage incidence was also much greater among the natives. Favus was found to be rare under the age of six years and was less common among girls. Cultures grew *Tr. glabrum* in 66 cases and *Tr. violaceum* in 42 cases. A few isolated examples of *Tr. fumatum*, *Tr. regulare* and *Tr. cerebriforme* were also found. All the cases of favus proved to be due to *A. schönleini*.

M. Sydney Thomson.

CATANEI (A.). Résultats de l'étude des teignes dans quelques agglomérations de la côte occidentale de l'Algérie et d'une nouvelle enquête en Oranie. [**Results of the Study of Ringworm among the Villages on the Western Coast of Algeria and of a New Investigation in Oran.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 694-699.

Investigations carried out along lines similar to those previously used in other parts of Algeria. Among 1,499 children of European stock there were 40 cases of Trichophyton infection of the scalp, 4 of

favus and 1 of *Microsporon Audouini*. Among 705 Mohammedan children 48 examples of scalp trichophytosis and 65 of favus were seen. The corresponding figures in 710 Jews were 19 and 9. Only among the Mohammedans was the percentage of infection higher among boys than girls. Cultures proved *Tr. violaceum* and *Tr. glabrum* to be the most common fungi, but *Tr. acuminatum*, *Tr. fumatum* and *Tr. crateriforme* were also found. All cases of favus were due to *A. schonleini*.

M. S. T.

URUENA (Jesus Gonzalez) & OCHOTERENA (Isaac). *Épidémies familiales de tondantes à Trichophyton pilosum*. [**Familial Epidemics of Ringworm due to *Tr. pilosum***.]—Reprinted from *Ann. Dermat. et Syph.* 1932. Mar. 7th Ser. Vol. 3. No. 3. pp. 244-254. With 12 text figs.

Among 137 cases seen in Mexico, 34 occurred in 15 different families. The scalp lesions were usually typical of the disease, but occasionally follicular hyperkeratoses and the rare "black dot" form were seen. In spite of these clinical differences the *Tr. pilosum* was apparently responsible in every case.

M. S. T.

MANSON-BAHR (P.). *Trichosporon beigeli* **Parasitic on Human Hair from Nigeria**. [Laboratory Meeting.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. p. 9.

Describes a specimen from the pubic hair, in which region there was an isolated patch of infection. The spores were demonstrated by Weigert's method and successful cultures were obtained after soaking the hairs in absolute alcohol for 30 minutes and then washing them in saline before inoculating Sabouraud's medium. The fungus produces small irregular nodes on the hair, the resulting disease being known as Trichomycosis nodosa of Behrend.

M. S. T.

PUNTONI (V.) & PAMPANA (E. J.). **A Copper-Coloured Variety of Carate caused by *Trichophyton megnini* (*Tr. rosaceum*)**.—*Jl. Trop. Med. & Hyg.* 1932. May 16. Vol. 35. No. 10. pp. 154-156. [15 refs.]

A detailed review of the literature concerning "Carate" is followed by a description of one case seen in Colombia. A negro, in whom the disease had persisted for eleven years, showed several small areas of a brownish coppery hue on both arms. On the abdomen there was a larger blackish sheet, whilst the back bore some lighter and shining patches. Specimens were sent to Rome for cultural investigation and presented an overwhelming growth of *Tr. megnini*. A few colonies of other organisms also developed but these were considered to be of very little importance in this case.

M. S. T.

KESTEN (B. M.), ASHFORD (B. K.), BENHAM (R. W.), EMMONS (C. W.) & MOSS (M. C.). **Fungus Infections of the Skin and its Appendages occurring in Porto Rico. A Clinical and Mycologic Study**.—*Arch. Dermat. & Syph.* 1932. June. Vol. 25. No. 6. pp. 1046-1057. With 5 text figs.

Eighty patients suffering from mycotic infections were studied. The clinical features were all typical and comprised scalp and nail lesions as

well as those of the glabrous skin and feet. Cultures were successful in only 46 per cent., the fungi being essentially the same as those found in more temperate climes. A case of apparent Acladiosis is described, but from it *Penicillium spiculisporum* was isolated. *M. S. T.*

MONTPELLIER (J.), CATANEI (A.) & LEFRANC (R.). Un nouveau cas de sporotrichose humaine observé en Algérie. [**Another Case of Sporotrichosis in Algeria.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 297-298.

A native woman aged thirty years. A year before she came under observation she had noticed a button-like lesion on the left foot. This spread until the inside of the foot, the ankle and the lower third of the leg were covered with nodules varying in size from that of a pea to that of a small nut. Each lesion had a sinus from which exuded a a sero-purulent discharge. Some ulceration and slight scarring were also present but there was no involvement of bone or glands. The organism proved to be *Rhinocladium beurmanni*. The disease is apparently healing under the influence of potassium iodide.

M. S. T.

ETCHEVARNE (C.) & NEGRONI (P.). De la localisation multiple du *Monilia albicans*. [**Widespread Localization of *Monilia albicans*.**]—*Rev. Sud.-Américaine de Méd. et de Chirurg.* Paris. 1932. June. Vol. 3. No. 6. pp. 477-482. With 2 figs.

An account of the lesions observed in an Argentine infant aged 3½ months. When first seen, irritable papules had been present on the exposed surfaces for about four weeks. There were also white patches on the tongue and on the mucous membranes of the cheeks, these being accompanied by fissuring at the corners of the mouth. Gradually the eruption invaded the whole of the trunk and became pustular; in the flexures it appeared as an excoriated intertrigo. Direct smears and cultures prepared from material from all the lesions, revealed the presence of the same organism, *M. albicans*. Borax and copper sulphate baths quickly resulted in cure. *M. S. T.*

FRÓES (Heitor P.). Sur un champignon brésilien producteur de mycétome à grains rouges (*Nocardia genesii*, H. Fróes, 1930). [**A Brazilian Fungus causing Mycetoma with Red Granules.**]—*Rev. Sud.-Américaine de Méd. et de Chirurg.* Paris. 1932. June. Vol. 3. No. 6. pp. 495-501. With 6 figs.

An account of further work carried out with material obtained from a case seen in 1915. The cultural and histological features which distinguish this organism from *N. pelletieri* and *N. africana*, are dealt with in detail. *M. S. T.*

FIALHO (Amadeu). Dermatite verrucosa. [**Dermatitis verrucosa.**]—*Brasil-Medico.* 1932. Aug. 20. Vol. 46. No. 34. pp. 731-732. With 2 figs.

The patient, a man of 45 years, presented himself with an ulcerating sore on the dorsum of his left hand, which had persisted for two years

or more in spite of varied treatment. Cultures resulted in the growth of granular blackish masses described as one of the Chromoblastomycoses, a name given to the group by FONSECA. Sections from the lesion showed marked keratosis, scattered isolated giant cells and minute collections of pus; epithelioid cells were seen in some, but not in all, sections. Healing followed the local application of chloride of zinc.

H. H. S.

DELANOË (E.). Eruption verruqueuse aux mains et aux pieds chez une fille musulmane. [**A Warty Eruption on the Hands and Feet of a Native Girl.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 325-326.

Very numerous sessile warts were seen on the dorsa of the hands and feet, with a few on the palms. The pathology was apparently simple. Three cc. of a ten per cent. solution of quinine and urethane were injected intramuscularly into the buttocks. This caused erythema and pain in the affected areas. Five subsequent injections were followed by similar changes, but during the course of treatment the warts gradually blackened and dried; eventually they vanished completely.

M. S. T.

PARDO-CASTELLO (V.). **Achromia Parasitaria: its True Nature and Etiology.**—*Arch. Dermat. & Syph.* 1932. May. Vol. 25. No. 5. pp. 785-789.

After a detailed examination of the literature the author epitomizes his present views. The disease really represents a group of epidermomycoses due to different fungi, *e.g.*, *Tinea flava*, *T. alba*, etc. The resulting achromia is probably caused by the action of the fungi on the pigmentary mechanism of the skin and is independent of sun effects. The dyschromia may be compared with the increased pigmentation which may persist for a long time after such inflammatory conditions as impetigo and eczema.

M. S. T.

AFRICA (Candido M.). **Studies on Experimental Creeping Eruption in the Philippines.**—*Philippine Jl. Sci.* 1932. May. Vol. 48. No. 1. pp. 89-101. With 5 plates & 1 text fig. [15 refs.]

This interesting paper deals with *Ancylostoma braziliense*, a hookworm very commonly parasitic in cats, and to a certain extent infesting also dogs and human beings, in the Philippines. In the Southern United States and Central America this species (first discovered in Brazil) is known more as a skin-parasite and one of the causes of creeping eruption in man. In the Philippines (and other parts of the Oriental region) it so far is known chiefly as an intestinal parasite—indeed among the Philippine natives no "natural" case of its causing creeping eruption in man seems to have been observed, and this fact seems to have been explained as due to a natural resistance or immunity of the human skin to such infestation. The author, however, has produced creeping eruption experimentally in two young male adult Filipinos quite clear of any evidence of intestinal infestation by applying third-stage larvae of *A. braziliense* to their skin.

A. Alcock.

- ASHFORD (Bailey K.). Las enfermedades micóticas en Puerto Rico.—*Bol. Asoc. Med. de Puerto Rico*. 1932. Apr. Vol. 24. No. 199. pp. 146-152. [15 refs.]
- BROSIOUS (Otto T.). Foot-Itch.—*Twentieth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1931. pp. 185-188.
- ESCOMEL (Edmundo). Sobre pinta o ccara en el Perú —*Crónica Méd.* Lima. 1931. Nov. Vol. 48. No. 821. pp. 367-371.

KALA AZAR.

SHORTT (H. E.) et al. **Reports of the Kala-Azar Commission, India. Report No. II (1926-1930).**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1932. Aug. Memoir No. 25. pp. iv.+200. With 1 fig., 1 chart & 10 figs. on 1 plate. [6 pages of refs.]

The Kala Azar Commission, which was formed in 1924 under the directorship of S. R. CHRISTOPHERS to carry out research work on this disease in Assam, came to an end in 1931 owing to the decline of the epidemic and the change in the character of the cases which continued to occur in small numbers, a change which rendered them unsuitable for experimental work. The report now under review is the second one of the Commission and has been compiled by H. E. SHORTT, who has been Director of the Commission since 1925. The first report (this *Bulletin*, Vol. 23, p. 567) recorded the work carried out up to October 1925, while the second covers the period between this date and the closing down of the commission in 1931.

The report under review is a collection of papers, many of them considerably curtailed for reasons of economy, which have already been published, together with nine which are published for the first time. In the introduction the position regarding transmission is reviewed. It is admitted that transmission by the bite of the sandfly, successfully accomplished in one instance, is the most attractive hypothesis but it has to be remembered that an equally strong claim, backed by more than one successful experiment, can be made for oral transmission. A third theory which may be regarded as combining the first two is that of infection by the oral route through the ingestion of infected sandflies or the products of crushing them. This theory is supported by one successful experiment. The view that the hookworm may play a part appears to be completely ruled out. It is pointed out that even if the natural method of introduction of parasites into the body is determined it would not follow that such an introduction would be invariably followed by kala azar. It would appear that some accessory factor rendering the individual more susceptible at the time of inoculation is necessary. It is noted that MCCOMBIE YOUNG drew attention to the fact that the epidemics of 1890-1900 and 1917-1929 were preceded by a devastating earthquake in the one case and by a more devastating influenza pandemic in the other. It seems possible that the final solution of the problem may have to await the onset of a fresh epidemic.

The nine papers which have not previously been published will be considered under their respective titles.

1. Changes in the Leucocyte Picture in Kala-Azar after Adrenalin Injection and their Significance [KRISHNAN (K. V.)]. pp. 23-31.

HUGHES and SHRIVASTAVA (1930) had shown that the injection of 1 cc. of 1 in 1,000 adrenalin solution into subjects of malaria was followed by an increase in the monocytes of the peripheral blood in 8 cases and a decrease in 2 cases. The 2 cases were severe and it was proved that after treatment and cure they reacted to adrenalin as the other cases had done. The suggestion was that the cells of the reticulo-endothelial system probably play an important part in overcoming malarial infection. The author of the present paper decided to test the reaction in cases of kala azar. The results show that in the majority of untreated cases there is a definite fall in the monocytes following injection

of adrenalin while after completion of treatment there is an increase, results which indicate that monocytes probably play an important part in recovery from kala azar. A reticulo-endothelial system exhausted by attacks of malaria may make an individual susceptible to kala azar, recovery from which, as in malaria, is dependent on the satisfactory response of this system.

2. Transmission Experiments in Kala-Azar with Hookworms [SHORTT (H. E.), CAMPBELL (H. G. M.) & LAL (C.)]. pp. 73-79.

The authors describe experiments designed to test the possibility of infection by hookworm larvae. Cultures were commenced with the eggs of both human and canine hookworms, and 24 hours later, when a large proportion of the eggs were hatched, an emulsion of the liver and spleen of a heavily infected animal was mixed in, the intention being to give the larvae the opportunity of ingesting *Leishmania donovani* in the form which might escape in faeces. The cultures were kept at 25°C. for six days by which time the larvae were in the infectious stage. They were utilized as follows. A number were crushed in a mortar and examined microscopically for evidence of leishmania infection. Others were fed to hamsters or placed on the shaved abdomen of these animals; still others were inoculated intraperitoneally. Of 27 hamsters treated in one or other of these ways none became infected. There was no evidence of infection of the larvae with leishmania.

3. Transmission Experiments in Kala-Azar by Contaminative Methods [SHORTT (H. E.), SMITH (R. O. A.) & SWAMINATH (C. S.)]. pp. 79-89. [13 refs.]

In this paper are recorded a number of experiments to test the possibility of infection by the contaminative method where the urine or faeces of infected human beings or animals were used as the source of infection. It had already been shown by SHORTT (1923) and SHORTT, SWAMINATH and SEN (1923) in the case of human beings that *L. donovani* might escape from the body in urine, an observation extended to hamsters by YOUNG and HERTIG (1927). This occurrence of leishmania in urine appears to be associated with the presence of blood which can be demonstrated in a considerable percentage of cases of kala azar. The authors state that recently they have demonstrated leishmania in the urine of two further cases of kala azar. Of a series of 10 hamsters to which the urine of cases of kala azar was administered by the mouth on an average 179.4 times and a series of 15 to which urine from infected hamsters was given on an average 164 times not one became infected. It having been shown by SHORTT, SMITH, D'SILVA and SWAMINATH (1929) that *L. donovani* sometimes escaped in the faeces of cases of kala azar similar experiments were conducted with faeces. With the faeces of kala azar cases 14 hamsters received on an average 37 feeds each, while with the faeces of infected hamsters 18 received on an average 151 feeds each. In only one case did infection result in a hamster fed 160 times during 467 days with hamster faeces.

Further experiments to demonstrate infection by the oral route are recorded. In these seven Chinese hamsters were given a dose of infected liver and spleen emulsion in normal citrated saline solution. These animals examined on an average 117 days after the feed all showed a heavy infection. In another similar experiment with Chinese hamsters the animals were killed and examined at short

intervals after feeding. It was determined that apparently unaltered parasites could be discovered in the intestine up to 48 hours after administration by the oral route and that they were demonstrable in the liver and spleen as early as a week after a single dose of infective material by the mouth.

A further series of experiments were carried out by housing in contiguous cages healthy and infected hamsters. An experiment of the kind had already been reported by SHORTT, CRAIGHEAD, SMITH and SWAMINATH (1930). In this in each of a series of boxes were placed two cages in contact with one another. In one cage of each pair was a healthy hamster and in the other an infected one. There was free contamination of each other's food by the respective units of each pair. Of six originally healthy hamsters two became infected. This result was so striking that it was repeated on a larger scale in the experiments here described. The type of association of the healthy and infected animals was varied slightly but of 37 healthy animals only one showed an infection. It had been in association with an infected animal for 453 days. When its infection was discovered its associate was examined and found to be free from infection. It was impossible to decide whether this was a case of recovery from infection or whether the animals had at some time been changed over, though the rule was that after the commencement of the experiment the cages were not to be removed from the larger receptacle at any time nor to be opened for cleaning. It is pointed out that cases of hamsters losing their infections are not unknown.

In another experiment three gibbons (*Hylobates hooluck*) were inoculated intraperitoneally with liver and spleen emulsion from infected hamsters and one of these was given in addition a large dose by the mouth. The animals were kept in a large ten foot cage with two normal gibbons. One inoculated gibbon died after 137 days and was found heavily infected. It was probably the animal which received the oral dose of material. Another inoculated animal examined after 357 days was found infected. Of the three remaining one was examined after 383 days and two after 490 days with negative result. One of the inoculated animals thus escaped infection or, what the authors regard as more probable, recovered.

4. Miscellaneous Experiments with *Phlebotomus argentipes* in Relation to Transmission of Kala-Azar [SHORTT (H. E.), SMITH (R. O. A.) & SWAMINATH (C. S.)]. pp. 90-102.

In this paper are described a series of experiments with sandflies. In the first place an attempt was made to infect six white mice by the bites of infected *P. argentipes*. The six animals were kept 63 to 289 days and were fed upon by sandflies 44 to 117 times. Of these sandflies some at least were proved to be infected. The result was entirely negative. In another experiment cultures were made on N.N.N. medium from a piece of ground-up skin of a mouse which had been removed from the animal after an infected sandfly had fed on it. The experiment was repeated three times but it was not possible to demonstrate that leishmania had been injected into the pieces of skin by the sandflies.

A series of Chinese hamsters were fed a number of times on emulsions of sandflies infected either by feeding on kala azar cases or by artificial feeding with an emulsion of infected liver and spleen by a modification of Hertig's method. In all 21 hamsters were used but only one, which had been fed 21 times on artificially infected sandflies, was found to be

infected 192 days after the commencement of the experiment. The method of feeding sandflies artificially is described. It consists in the insertion of the proboscis into a fine capillary tube, the fly being held during the process by its wings inserted into a split in a piece of cork.

Another section of this paper is devoted to a consideration of the bionomics of *P. argentipes* in Assam, where the year is divisible into a rainy and a cold season; the former with an average temperature of 84°F. covers the period March to October while the latter has an average temperature of 60°F. In Assam there is thus no true hot weather, the discomfort of the rainy season being due to the excessive humidity. The sandflies are practically absent during the cold season; adults beginning to appear in mid-February are numerous in March and April. The maximum prevalence is in September and October. Other features noted are those connected with feeding habits, oviposition, number of eggs laid, duration of the embryonic, larval and pupal stages, breeding sites, food and others, all of which have an indirect bearing on the question of kala azar transmission.

5. Miscellaneous Experiments in Kala-Azar [SHORTT (H. E.), SMITH (R. O. A.) & SWAMINATHI (C. S.)]. pp. 103-108.

In this the next paper are described various experiments and observations not previously published.

The transmissibility of *Leishmania donovani* through the placenta was tested by the examination of fifteen young mice born of infected parents. In no case was infection detected.

The claim by YOUNG and HERTIG (1927) that they had infected Chinese hamsters with the leptomonad of the N. African lizard *Tarentola mauritanica* led the authors to make similar experiments with the leptomonad of the Indian gecko of the genus *Hemidactylus*. On one occasion SHORTT and SWAMINATHI (1928) found leishmania forms of this parasite in the peripheral blood of a gecko. Usually the flagellate is only demonstrable by culture of the blood. Cultures of the flagellate were inoculated on a number of occasions to two hamsters but no infection resulted. As from geckos themselves the flagellate is only occasionally cultivated it seemed possible that its presence in the blood might be accidental as a result of invasion from the intestine shortly after ingestion by the gecko of some infected insect. Accordingly geckos were fed on cultures of the flagellate but no infection was subsequently demonstrable.

The authors record the growth of a trypanosome in a tube of N.N.N. medium inoculated with liver puncture material from a human being for diagnosis of kala azar. The trypanosome was easily sub-cultured and grew with great rapidity. The trypanosome was mostly in the crithridial form but in old cultures trypanosome forms of the *T. lewisi* type occurred. Reinvestigation of the human subject did not support the view that the trypanosome originated from him. It was concluded that it was probably the trypanosome of the rabbit whose blood had been employed to make the medium.

An unusual type of dermal leishmanoid is described from a village at the foot of the Khasi Hills. It was noticed that the legs below the knees were greatly thickened and suggested elephantiasis. On closer inspection the arms, trunk and face were seen to be similarly affected. The whole of these areas but especially the legs were covered with reddish nodules small and large. The case appeared at a distance like elephantiasis but near like nodular leprosy. Numerous leishmania

were found in the lesions. The man stated that two years previously he had suffered from kala azar but had recovered without treatment. The condition described had been developing for a year. As SHORTT, D'SILVA and SWAMINATH (1928) had successfully infected *Phlebotomus argentipes* by feeding on a case of dermal leishmanoid it was thought that the case described here would give even better results. However, out of 203 sandflies fed on the lesions not one became infected. On cutting sections of one of the nodules it was found that the parasites were in most cases too far below the epidermis to be reached by the proboscis of the sandfly.

With reference to the relative value of direct microscopical examination or culture of liver or spleen puncture material it is pointed out that of 709 positive cases in which the material was subjected to both tests in only 28 cases did the culture method reveal an infection missed by the microscopical examination. As regards parasites in the peripheral blood, of 942 patients suffering from kala azar 688 revealed parasites after a single examination.

Reference is made to animals susceptible to inoculation. The Hooluck (*Hylobates hooluck*) and the Slow loris (*Nycticebus coucang*) were both readily infected by intraperitoneal inoculation of infected liver or spleen.

Finally it is recorded that of 36 bed bugs fed on a lesion of dermal leishmanoid one showed flagellate forms when dissected subsequently.

6. A Comparative Study of Susceptibility to Infection with *L. donovani* in Splenectomized and Non-Splenectomized Mice [KRISHNAN (K. V.)]. pp. 109-112. [28 refs].

In this paper are described experiments destined to test the influence of the spleen on susceptibility to inoculation with *Leishmania donovani*. Both splenectomized and normal mice were inoculated with infected spleen emulsion or with cultural forms of the parasite preceded or not by injections of Indian ink. There was no difference in the susceptibility of the normal and the abnormal animals.

7. The Viability of *Leishmania donovani* outside the Body of its Mammalian Host [SHORTT (H. E.), SMITH (R. O. A.) & SWAMINATH (C. S.)] pp. 136-140.

It is noted that the observation that leishmania might occur in the urine and faeces of kala azar cases has been repeated in more recent work. As it did not follow that parasites thus discharged from the body would survive for any length of time experiments were designed to test the survival time under various conditions. It was found that in the forms from the liver and spleen survival in full strength milk would occur for four days as demonstrated by culture in N.N.N. medium. In milk diluted with citrate of sodium solution actual culture of the parasite was obtained. On the surface of sterile soil moistened with sterile urine or water survival for 24 hours occurred. Dried on pieces of glass the parasites, except in one doubtful experiment after four hours, were invariably killed.

8. The Incidence of Achlorhydria amongst the Population of a Kala-Azar Endemic Area and its Significance [KRISHNAN (K. V.)]. pp. 191-194. With 1 chart.

If the mode of infection with kala azar is by the mouth then the acid content of the stomach is likely to be of some importance. Accordingly

the gastric acidity of the population of an endemic area of kala azar was investigated. The results revealed the fact that about 27 per cent. showed achlorhydria. In malarial cases the incidence is much higher (about 30 to 60 per cent.). A large percentage of kala azar cases also show this condition (about 30 to 45 per cent.). It would seem therefore that the lowered acidity of the stomach contents in malarial subjects should render them more suitable than normal persons for oral infection with kala azar.

9. Notes on Some *Culicoides* from Assam [SMITH (R. O. A.) & SWAMINATH (C. S.)]. pp. 182-186. With 10 figs. on 1 plate.

The last of the papers not previously published deals with *Culicoides* in Assam and is of purely entomological interest. C. M. Wenyon.

SCOTT (Annie V.). **Kala-Azar in Children of North China.**—*Arch. Dis. in Childhood*. 1932. Apr. Vol. 7. No. 38. pp. 59-64. With 1 chart in text.

— **The Treatment of Kala Azar in Children.**—*Ibid*. 1932. Aug. Vol. 7. No. 40. pp. 213-224.

The first paper gives an account of the clinical features of one hundred cases of kala azar as observed in children aged one and a half to twelve years in North China. The disease appears to correspond in all respects with infantile kala azar of other endemic centres. In the second paper the author describes the treatment of 134 cases with various preparations of antimony. The drugs used were sodium antimony tartrate, antimosan 681, stibamine glucoside, stibosan 471 and neostibosan. Of these the author writes the least favourably of the first, which requires a long course and is directly related to the occurrence of bronchopneumonia, and the most favourably of neostibosan, the full course of which can be given in a shorter time than that required for any of the other drugs, all of which, however, may bring about a cure. As regards the criterion of cure the only one at present available is the continued freedom from symptoms. C. M. W.

FRANCO (E. E.) & MANAI (A.). Nuove ricerche sulle leishmaniosi in Sardegna. [**Leishmaniasis in Sardinia.**]—*Ann. di. Med. Nav. e Colon*. 1932. Mar.-Apr. 38th Year. Vol. 1. No. 3-4. pp. 137-153. With 2 plates (1 map). English summary.

The paper gives a brief account of 24 cases of kala azar and 7 cases of oriental sore which have occurred in Sardinia. All the cases were diagnosed by discovery of leishmania, five of them having been seen by the authors themselves, the others having been heard of by them indirectly. On a map is shown the distribution of the cases in the island. C. M. W.

CASSOUTE, GIRAUD (Paul) & TRABUC (Fernand). Un nouveau cas autochtone de kala azar chez l'adulte. Guérison par le traitement stibié. [**A Fresh French Case of K.A. in the Adult.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1932. July 4. 48th Year. 3rd Ser. No. 23. pp. 1070-1072.

Though cases of infantile kala azar are fairly common in France, over a hundred having been recorded, cases in adults are rare. On this account

the authors are led to describe a case in a young woman twenty years of age. This is the fourth adult case to be recorded from Marseilles and the eleventh for France in general. A cure was effected by treatment with tartar emetic followed by neostibosan. C. M. W.

GUHA (Prankumar). **Reticulo-Endothelial System in Kala-Azar.**—*Calcutta Med. Jl.* 1932. June. Vol. 26. No. 12. pp. 469-482. [13 refs.]

As in eight out of twelve cases of kala azar a delayed direct van den Bergh's reaction and a positive reaction for urobilin in the urine was obtained, the author considers that these results may be of assistance in the diagnosis of the disease. In all cases of kala azar tested the liver function test with levulose was normal. C. M. W.

UZAN (Lucien) & SANTILLANA (A.). Sur la valeur diagnostique et pronostique du syndrome humoral dans le kala-azar. [**Diagnostic and Prognostic Value of Chemical Reactions in K.A.**]—*Tunisie Méd.* 1932. July-Aug. Vol. 26. No. 7. pp. 341-345.

Investigating in a case of infantile kala azar the formol-gel, the antimony and the distilled water reactions, the authors were struck by the fact that they were still positive at the end of a course of treatment with tartar emetic when it appeared that a clinical cure had been obtained and there had been an absence of fever for fifty-seven days. The treatment consisted of the injection, every second day, of one centigram of the drug till forty injections had been given. The persistence of the positive reactions led the authors to consider a further course of treatment, but a week later the reactions were less marked so that they think it possible that the humoral equilibrium is not re-established till some time after a clinical cure has been obtained. C. M. W.

CHOPRA (R. N.) & CHAUDHURY (S. G.). **The Prognostic Value of the Aldehyde Reaction in Kala-Azar.**—*Indian Med. Gaz.* 1932. May. Vol. 67. No. 5. pp. 260-262.

If in a case of kala azar the time of gelation of the serum after the addition of formalin as carried out in the aldehyde test is known, any increase in this time after treatment has been commenced may be regarded as a favourable sign. If in any case the time of gelation is over half an hour, satisfactory progress towards cure may be assumed to be taking place. C. M. W.

KRISHNAN (K. V.), LAL (Jemadar Chiranji) & NAPIER (L. Everard). **Cytological Studies of the Blood and Tissues in Kala-Azar and Associated Conditions. Part II. Morphology of the Leucocytes in Supra-vital Preparations.**—*Indian Med. Gaz.* 1932. Mar. Vol. 67. No. 3. pp. 130-135. With 26 coloured figs. on 1 plate. [17 refs.] **Part III. Large Mononuclear Cells in Human Malaria** [NAPIER et al.].—*Ibid.* pp. 135-139. With 2 charts in text. [10 refs.] **Part I. Supra-vital Staining Technique** [NAPIER et al.].—*Ibid.* 1932. May. No. 5. pp. 251-254. [10 refs.]

In studying the cells of the blood and tissues in kala azar and allied conditions by methods of vital staining, it was necessary first to adopt a definite nomenclature. To this end the leucocytes of the blood of a number of healthy human beings and animals were studied. The first

paper (Part II) describes the characters of the polymorphonuclear leucocyte, the eosinophilic leucocyte, the lymphocyte and the large mononuclear cell; the last embracing both the monocyte and the histiocyte. These various cells are illustrated in a coloured plate which shows clearly the size and shape of these cells, the type of nucleus of each and the various granules as displayed by supra-vital staining with a mixture of neutral red and Janus green. The variations in the relative proportions of these cells in man and in the monkey, rabbit, mouse and hamster are shown in a Table. In the second paper (Part III) are discussed the findings as regards the large mononuclears in 60 specimens of blood from 12 cases of human malaria before and after treatment. In acute malaria before treatment the large mononuclear count ranged between 4 and 10 with an average of 7 per cent. The monocytes were less than 2 per cent., and the intermediate forms and histiocytes 2.5 per cent. each. After the administration of specific drugs there was a marked rise to 6 to 17, with an average of 11 per cent., the monocytes and histiocytes both contributing equally to this increase. In chronic malaria before treatment the count is low, 2 to 7 with an average of 4.5 per cent. The cells are mostly monocytes with few intermediate forms and fewer histiocytes. After treatment there is an increase to about 6 per cent., which is less than in acute cases. To this figure all three types of cell contribute equally. It thus appears that one of the beneficial functions of antimalaria drugs is the stimulation of the natural process of cellular immunity, namely the mobilization of the large mononuclear phagocytic cells of the reticulo-endothelial system. In the process of cure both monocytes and histiocytes play equally important parts. It is hoped that this study of the behaviour of cells in malarial infections will afford an explanation of the fact that malarial subjects are more liable to be attacked by kala azar than normal individuals and throw some light on the whole question of susceptibility to this disease.

The last paper (Part I) of this series, describes in detail the technique of supra-vital staining with neutral red and Janus green. It is of the utmost importance that perfectly clean and smooth slides and cover glasses should be used and the method of preparing these is described. On the clean slide is left by a draining process a very thin film of alcoholic stain which is carefully dried. On this the cover glass with its drop of blood or other body fluid is inverted, the preparation thus formed being examined on the warm stage if necessary. In the main the method is that of SABIN and her co-workers. It is pointed out that the coloured granules which appear in mononuclear cells are not the result of staining of preformed granules in the cell but are collections of granules of stain which have been phagocytosed by the cell and distributed in its cytoplasm in a selective manner so that particular types of cell can be recognized by this distribution. It is noted that for satisfactory and uniform results the method requires a good deal of experience. Those who wish to employ it should consult the original article for details.

C. M. W

SHORTT (H. E.) & SWAMINATH (C. S.). **The Relative Susceptibility of Chinese Hamsters (*Cricetulus griseus*) to Kala-Azar by the Oral and Subcutaneous Routes.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 135–138.

In a series of tests with Chinese hamsters it was found that employing the non-flagellate forms of *Leishmania donovani* infections were as

readily produced by the subcutaneous as by the oral route of administration. With the flagellate stage from the culture tube the subcutaneous route was more effective than the oral. The infection rates were practically 100 per cent., except in the case of administration of flagellate forms by the mouth, when it was under 50 per cent.

C. M. W.

GIRAUD (Paul). Sur l'origine canine du kala-azar méditerranéen. [**The Canine Origin of Mediterranean K.A.**].—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 558–561.

Examining the conditions of life, especially the possibility of association with dogs, of 59 cases of infantile kala azar in Marseilles, the author concludes that though it is not impossible that human beings contract the disease from dogs the available data are insufficient to prove this. It appears to him more probable that the human and canine diseases are independent of one another though spreading simultaneously amongst children and dogs respectively.

C. M. W.

ADLER (S.) & THEODOR (O.). **Investigations on Mediterranean Kala Azar. VI.—Canine Visceral Leishmaniasis.**—*Proc. Roy. Soc. Ser. B.* 1932. May 2. Vol. 110. No. B 768. pp. 402–412. With 7 figs. on 2 plates. [20 refs.]

The authors call attention to the fact, already noted by them, that in canine kala azar in Malta the parasites occur throughout the skin of the body in macrophages which are found not only in infiltrations round hair follicles but also in apparently normal dermis. This distribution of parasites in the skin differs from that in canine oriental sore, where infiltration of macrophages is dense and not confined to hair follicles, while the presence of these cells in the dermis is accompanied by infiltration with plasma and small round cells. The accumulation of infected macrophages round the hair follicles in kala azar leads to the condition of seborrhea and depilation, the chief cutaneous manifestations of the disease. The presence of parasites in the skin of dogs appears to have a direct influence on the infection rate in sand-flies fed on them. Thus of *Phlebotomus perniciosus* fed on three infected dogs infection rates of 64·5, 32 and 62·5 per cent. were obtained. Of 113 of these sand-flies fed on two cases of infantile kala azar in Malta none became infected. Previously in Catania an infection rate of 6·25 per cent. was obtained when only selected cases were used. It thus appears that though in human cases the spleen infections are very much heavier than in dogs, the infection rate in *P. perniciosus* fed on human cases is negligible as compared with that obtained by feeding on dogs. Of 100 dogs examined in Malta 11 were found infected. A number of dog fleas collected from infected dogs, and a few *Stegomyia fasciata* and nymphs of *Rhipicephalus sanguineus* fed on an infected dog and kept for a number of days were dissected without showing any microscopic evidence of leishmania.

C. M. W.

DELAMARE (G.), GATTI (C.) & GONZALEZ (D.). Le pied végétant du Paraguay (leishmaniose américaine ulcéro-végétante). [**"Mossy Foot" due to Leishmania in Paraguay.**].—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 488-494. With 12 figs. on 2 plates.

Cutaneous leishmaniasis in S. America may produce on the foot, particularly its dorsum, a lesion consisting of papillomatous outgrowths or vegetations of a cauliflower character. Usually a single patch, which may cover the entire dorsum of the foot, occurs but sometimes other patches are found on the heel or side of the foot or on the toes. The vegetations may be soft or hard according to the degree of keratosis which has taken place. When a condition of hyperkeratosis is found the induration is so marked as to be impenetrable to X-rays. The disease is a very chronic one and in eight out of ten cases mentioned as having been seen in Paraguay during the past five years was associated with ulceration and erosions of the nose, leading in three of the cases to perforation of the septum. In two of the cases the nasal lesions were associated with vegetations on the palate. Leishmania were discovered six times in smears and twice in sections. Diagnosis is not as a rule difficult for the foot condition is purely local not producing atrophy of the leg, enlargement of the glands or constitutional disturbances such as are caused by diseases with which confusion can occur. Under tartar emetic treatment improvement may occur but relapse is very liable to take place. These chronic lesions of the foot respond less favourably to treatment than the cutaneous ulcerations or the mucosal lesions of the mouth and nose. C. M. W.

SCATURRO (Alberto). Nuovi casi di bottone d'oriente in provincia di Agrigento. Contributo all'unicità dei parassiti di Wright e di Leishmann [sic]. [**Oriental Sore in Agrigento.**].—*Riv. Sanitaria Siciliana*. 1932. Apr. 1. Vol. 20. No. 7. pp. 483-485. English summary (4 lines).

In recording further cases of oriental sore from the province of Agrigento in Italy the author calls attention to the fact that several of these cases occurred in individuals who had been living in close association with children suffering from kala azar. He sees in this an argument in favour of the identity of the parasites of kala azar and oriental sore. C. M. W.

LAQUEUR (B.). Beitrag zur Therapie der Leishmaniosis cutanea. [**Treatment of Dermal Leishmaniasis.**].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Sept. Vol. 36. No. 9. pp. 489-491.

The author, who has had a large experience of oriental sore in Termes in Usbekistan, says that he has treated over 200 cases with a camphor ointment made by mixing together equal parts of camphor, olive oil and beeswax. The treatment is simple and certain and requires no special apparatus. It can be carried out by patients in their own homes and brings about healing of the sore in one to four weeks. Its use in the case of sores of the nose and eyelid is contraindicated as in these situations it leads merely to an extension of the ulcerative process. C. M. W.

SCHWARZMANN (B. E.). [On the Cultivation of and Preparation of Vaccines of *Leishmania*.]—*Trof. Med. & Vet.* Moscow. 1931. Vol. 9. No. 1. pp. 1-3. [23 refs.] [In Russian.]

Description of the methods used for the cultivation of *Leishmania tropica* in N.N.N. medium for the preparation of a vaccine for active immunization, as recommended by CHODUKIN. The vaccine consists of a saline suspension of washed flagellates killed by heat. C. A. Hoare.

Rizzo (A.). Sul bottone d'Oriente unico delle palpebre. (La prima osservazione in provincia di Messina.) [Oriental Sore of the Eyelid in Messina.]—*Riv. Sanitaria Siciliana*. 1932. Feb. 15. Vol. 20. No. 4. pp. 260, 263-266. With 1 text fig. [18 refs.] English summary (3 lines).

The paper describes a case of oriental sore in a boy, there being a single lesion on the upper eyelid. This is the first case to be noted from the province of Messina. C. M. W.

D'OELSCHITZ (M.). Le diagnostic et le traitement du kala-azar de l'enfant et de l'adulte. [Diagnosis and Treatment of K.A. in Child and Adult.]—*Arch. Méd. Gén. et Colon.* formerly *Rev. Méd. de France et des Colonies*. 1932. Jan. Vol. 1. No. 1. pp. 3-24.

A general account of kala azar contributing no new information.

C. M. W.

MISCELLANEOUS.

LAMBERT (S. M.). **Health Survey of Rennell and Bellona Islands.**—14 pp. With 1 map. 1932. Suva, Fiji.

The early explorers of Polynesia—Cook, Wallis, Bougainville and their contemporaries in the second half of the eighteenth century—discovered a race of men who had no metal or clay or flint but who had built up a complex and beautiful civilization without these materials. The Polynesians, as they were in those days, were craftsmen: they were expert at wood carving, at making nets and mats from fibres and garments from bark cloth (*tapa*). They made fire by friction, and cooked their food among hot stones in a pit. They constructed great and beautiful houses which were held together by being tied with fibre, and they also made enormous canoes in which they were able to undertake ocean voyages. The people themselves were friendly, courteous, inquisitive and extremely acquisitive, for they had all things in common and knew nothing of the rights of private property. They lived and worked in groups, large parties fishing, gardening or singing together. They saluted one another and strangers by rubbing noses; their hospitality was unbounded and they always provided women for the passing stranger. Their social life was governed by a system of *tabu*, that is to say of permissions and prohibitions which had divine sanction: disobedience to the *tabu*, or what we should call crime, was to them unthinkable and unknown. They were ruled by great chiefs, and the person of some of the chiefs was sacred and not to be approached because of the god who dwelt in the man.

Nearly all this life vanished within half a century of the discovery of the islands; all the larger archipelagoes were rapidly civilized by Europeans who cared nothing for what they were destroying. Fragments of the old life remain in a few remote places, which have been spared from the ruthless hand of civilization because they are small and because the people are idle and the products of the country of no value to Europeans. It is for this reason that a little of primitive Polynesia still exists, particularly along the fringe of the Solomon Islands in such islands as Tikopia, Sikiana and the Reef Islands. Some of the poorer and more remote atolls, particularly in the Paumotus, still harbour relatively unaltered Polynesians. But the most interesting relics are the islands of Rennell and Bellona, which have only been influenced by Europe to a very slight extent. Indeed there is no record that any foreigners landed on Rennell before 1856, though we suppose that a few whalers or traders may have done so. Since that date there have been only about eight recorded landings, and Bellona has been even less visited.

In 1930 both islands were visited by Dr. S. Lambert of the International Health Division of the Rockefeller Foundation, who appears to have spent nearly three weeks on them. His name is well known as an authority on Polynesia and Melanesia, in which he has travelled much more extensively than any other medical man. His knowledge of other archipelagoes has enabled him to write a very interesting account of his short visit and to learn as much as was possible in the circumstances. The difficulties were very great. The language is not known to any European, though a vocabulary was collected some years ago, and pidgin English, always inadequate, was only understood by two or three of the people of Rennell. Apart from this difficulty, he

found it almost impossible to enter into the mind of a people whose background and upbringing are so utterly unfamiliar.

Much of the report deals with the material culture and social life of Rennell and, to a less extent, Bellona ; these pages should be read by those to whom they are particularly interesting. To us the parts which are of more immediate value are those which relate to health, and the reader is to understand that those studies are perhaps the only ones that have been made by a medical man among an unaltered Polynesian people. When one remembers the very great difficulties which confronted the worker, and the impossibility of doing much that was desirable, one must congratulate Dr. Lambert on his collection of facts. He gives a clear history of the introduction of foreign diseases ; every time a ship has called there has been an epidemic. The commonest introduced diseases seem to have been colds and coughs, though he speaks also of tuberculosis. It appears that dysentery has also been introduced by Europeans, and that it has died out ; gonorrhoea has also been introduced, and there is no evidence that it persists. No reference is made to measles or smallpox, which have decimated some islands of the Pacific. It appears that very few diseases are truly indigenous. The people suffer from yaws, though a previous investigator failed to find evidence of this disease because the sufferers are quarantined in the bush. It is a matter of great interest to know that yaws exists in these islands, because it has once or twice been suggested that it is not truly native in Polynesia : but the balance of evidence appears to show that it has existed for centuries in practically all parts of Melanesia and Polynesia. Some species of hookworm was also found to be present in nine out of sixteen individuals ; owing to the people's fear of magic, it was a matter of extreme difficulty to obtain any specimens of faeces and the species of worm was not identified. The elevated coral of which Rennell consists is so porous that there is no surface water, and Lambert failed to find any *Anopheles*. It is frequently a matter of great difficulty to assure oneself that *Anopheles* is absent from an island which consists of very porous soil, and it would be well that investigators should make a special search for the larvae at the points where fresh water seeps out on the beach just about high water mark. Malaria is apparently absent—at least none was found by examining spleens. If we accept it that *Anopheles* and malaria are absent, then the apparent absence of filariasis becomes of great interest. It will be remembered that, in the New Hebrides, there is a strong tendency for the filariasis and the malaria rate to vary together, which suggests that the principal vector of the filaria is *Anopheles punctulatus*. The matter requires fuller investigation in some part of Melanesia. Collections of mosquitoes and flies were made, and among them *Aedes variegatus* was found both on Bellona and Rennell.

Dr. Lambert found time to make a detailed census of considerable parts of the population : he records a count of 723 individuals of all ages in certain districts. The numbers of males and females in the population as a whole are approximately equal. This is consistent with general experience of Polynesian populations ; it is only in certain Melanesian races that considerable disparity exists, there being 110–120 males per 100 females in the population as a whole. It is most interesting to compare Lambert's figure for the population, which he puts at 1,200–1,500, with the rougher estimates made by other visitors within the last dozen years. Deck's estimate was 500 and Stanley's 700, neither of these investigators having made actual counts of large

samples of the population. It is currently assumed that rough estimates are on the generous side, but in this case it is clear that the error was large and in the other direction. The point is of some interest because so much use has to be made of rough estimates by everyone who discusses the population problems of the Pacific.

As one reads Lambert's description of his visit to Rennell and Bellona, one is reminded (except perhaps in details of phraseology) of the work of the earlier explorers. The life which exists to-day in these islands is the life which Banks described so vividly when he visited Tahiti with Cook on the expedition of 1768-1771. Every reader of this report will feel the dilemma which confronts the administration of the Solomon Islands. Is it their duty to the people and also to our descendants to conserve these relics which have continued to exist to the present day because of a series of fortunate accidents? Or should these people be intensively studied and every fact and detail put on record? If they are to be conserved, then we must refrain from studying the language or habits of the people or their diseases, because any visit of Europeans will tend to cause the existing life to disappear. Everyone who has travelled in Oceania would wish to make a prolonged stay on Rennell: he would also wish that all other students should be totally and permanently excluded. But even this compromise would not satisfy the islanders, for they already know a little of the effect of our civilization on communities such as theirs. They wish to have nothing to do with us: they want no government, no doctor and no missionary. On the whole perhaps they are wise.

The report consists of a multigraphed map and 14 pages printed in Suva, Fiji. We suppose that it is an official report to the High Commissioner of the Western Pacific, though that is not stated. We regret that it has not been published in a more accessible way, and we may be permitted to point out that no copy has been received by this Bureau and that we only owe our knowledge of this work to the fact that a private individual called our attention to it. *P. A. Burton.*

REVIEWS AND NOTICES.

SPREHN (Curt E. W.) [a.o. Professor für Parasitologie und angewandte Zoologie a.d. Universität Leipzig]. **Lehrbuch der Helminthologie. Eine Naturgeschichte der in deutschen Säugetieren und Vögeln schmarotzenden Würmer, unter besonderer Berücksichtigung der Helminthen des Menschen, der Haustiere und wichtigsten Nutztiere.** [Textbook of Helminthology. A Natural History of the Worms parasitic in German Mammals and Birds, especially those of Man, Domestic Animals and Animals of Economic Importance.]—pp. xvi+998. With 374 figs. 1932. Berlin: Gebrüder Borntraeger, W 35 Schöneberger Ufer 12a.

The days are fortunately past when helminthology was looked upon as merely a department of medicine. Indeed the day now seems to be almost at hand when, even in the most old-fashioned universities, instead of being regarded as an insignificant and scarcely respectable branch of zoology, it will find a more prominent place in zoological courses. The older text-books on parasitology dealt with a very limited number of parasitic worms, and tended to give the student an entirely false conception of the scope of the subject of helminthology. During the last three or four years several text-books, mostly in English, have appeared in which the immense advances recently made in this field are reflected and made available to a larger public. Some of these works have been devoted exclusively to the parasitic worms, but practical considerations have caused them still to confine their attention to those occurring in man and the commoner domestic animals.

The present German work is more extensive and more ambitious than any of its predecessors. As its sub-title indicates, its intention is to deal with the worms parasitic in mammals and birds found in Germany, with special reference to those occurring in man, the domestic animals and other animals of economic importance. This marks a great advance. By the extension of the boundary to include the parasites of wild animals, a large number of species are brought under review which are not dealt with in most text-books, while the fur trade has in recent years added a good many animals, often of non-European origin, to the economic list. It only seems a pity that, having gone so far, Dr. Sprehn could not have gone beyond the two highest groups of vertebrates, but this, of course, would have been an almost superhuman task.

The first part of the work deals generally with the natural history of helminths, and includes, among others, sections on the principles of nomenclature and classification; structure and life-histories; diseases caused by worms (with diagnostic methods, treatment and prophylaxis); and helminthological technique. The technical methods described, while reliable and efficient, are for the most part commendably simple, and highly elaborate procedures, such as are sometimes advocated, have been wisely avoided.

The second and larger portion is devoted to a systematic account of the parasites. In addition to the four main groups of parasitic "worms" generally recognized, the Pentastomida are included. There is an ample supply of diagnoses and keys to the species, genera and higher groups. The species considered economically important are briefly but sufficiently described. Species occurring in wild hosts are mentioned without description, but their synonyms, brief data as to their life-histories, and references to the literature upon them are given. A few species which have not been recorded in Europe seem to have crept in accidentally, and a good many typographical and other errors occur in this part of the book. Some of these are corrected in a list of "Berichtigungen" at the end of the volume,

but more attention might have been given to the spelling of names, particularly authors' names. The repeated spelling of *Wuchereria* as *Wucheria* is rather unfortunate.

The first description of new species in a work such as this is a practice which systematists would do well to avoid. In the present book several species are described as new. It would surely have been better to have published the descriptions of these first in some recognized and easily accessible journal.

There are two good indices, the first in the form of a host-list for all the mammals and birds dealt with, the second a general index to the names (including synonyms) of the parasites. There is also an extensive and useful list of references to literature, of which over 1,250 are given.

The numerous illustrations, a large proportion of them original, are a somewhat unhappy mixture of good and clear drawings with indifferent photomicrographs. Photomicrography, as applied to helminthological subjects, does not yet seem to have proved very satisfactory, and in most cases where it has been employed one feels that a camera-lucida drawing would have been better.

Dr. Sprehn is to be congratulated on a very courageous and on the whole successful attempt to deal with a vast and ever-growing subject. His book will undoubtedly prove of very great value to those who have need of such a work of reference. Above all, the breadth of view with which he has planned his undertaking is highly praiseworthy. He has given the student an enlarged, and it is to be hoped a not too terrifying, conception of the subject of helminthology.

H. A. Baylis.

HELMINTHOLOGICAL ABSTRACTS. Supplement to the Journal of Helminthology. 1932. July. Vol. 1. No. 2. pp. 33-78. Institute of Agricultural Parasitology, Winches Farm Drive, Hatfield Road, St Albans.

Helminthological Abstracts, the second number of which has recently appeared, is issued by Professor LEIPER from the Institute of Agricultural Parasitology. There are to be five parts annually of abstracts of papers on applied helminthology—human, animal and agricultural. The arrangement is alphabetical by journals. In No. 2, 62 journals are thus reviewed. The gist of the contents is given in a few lines of leaded type and further detail follows if required. Obviously in *Helminthological Abstracts* we have a valuable record of current work on this subject, all the more so in that it covers the whole field. The subscription price is 16s. 6d. a volume.

A. G. B.

WATT (John Mitchell) [M.B., Ch. B. (Edin.), Professor of Pharmacology in the University of the Witwatersrand, Johannesburg] & **BREYERBRANDWIJK** (Maria Gerdina) [Phil. docta. (Utrecht), Apotheker (Utrecht)]. **The Medicinal and Poisonous Plants of Southern Africa being an Account of their Medicinal Uses, Chemical Composition, Pharmacological Effects and Toxicology in Man and Animal.**—pp. xx+314. With 12 coloured & 20 black and white illustrations. 1932. Edinburgh: E. & S. Livingstone. [25s.].

The ordinary medical practitioner in any part of the Tropics or Subtropics, confronted with a case of sickness or death known or suspected to be caused by the application or ingestion of part of a plant would be greatly helped in his diagnosis and remedial measures if he had at his command a book of moderate size, giving short, clear and not too technical descriptions of the poisonous plants likely to occur in his area, their distribution and habitat, simple figures of the plants or parts of plants usually

employed, the symptoms caused by them and the active principles responsible, methods of identification microscopical or chemical of ejected or dejected fragments and lines of treatment. As the average practitioner is seldom also an expert botanist a classification of the plants by their main toxicological effects would probably be more convenient than a strictly botanical one. Should his interest extend to the vegetable *materia medica* used by the natives of his district similar considerations apply.

The production and utility of such guides depend, along with other factors, on the existence in readily available form of a sufficiently extensive and exact body of knowledge regarding the chemistry, pharmacology and toxicology of the plants concerned. Unfortunately for large areas of the warmer regions this is still lacking. There is quite an extensive literature on medicinal and poisonous plants, but much of it is scattered in a host of different periodicals in diverse tongues or in books difficult to obtain.

The present work comes from the Department of Pharmacology of the University of the Witwatersrand, where one of the authors is the Professor of Pharmacology and the other a research worker in the Department, and it is to be welcomed as at least laying down the foundation for the body of knowledge mentioned so far as the greater part of Africa south of the Equator is concerned. It is not a botanical guide as a reader looking only to the title on the book-cover might erroneously infer, for there are no descriptions of the plants nor is their distribution given. Its scope is precisely indicated by its full title.

The expression "Southern Africa" is not defined, but one infers from Appendix II that it covers in addition to the Union of South Africa the Portuguese possessions on both coasts and the British territories outside the Union northwards to over 10°S. Over such a vast area with so many different tribes and such a wealth of species the number of plants known or reputed to be medicinal or poisonous is of course enormous. Some 1,500 species of flowering plants, indigenous and introduced, belonging to over 600 genera and 122 families are dealt with, and a small number of Cryptogams are also included in the survey. Under each species is given what information the authors have collected regarding its medicinal use or its reputed virtues, the tribe or tribes by whom used, the native name or names and if a poisonous plant its effect on man or animal. At the end of each family of plants is a list of the publications consulted.

Lack of precise knowledge of the chemistry and physiological effects of many of the species has compelled a classification of the material under botanical families, an arrangement not very helpful to the average medical man. To compensate in some degree for this the authors have given, in addition to an index of the botanical names, three other copious indices—one of the English and Afrikaans names of the plants and of the diseases caused by them, another of native names and a third of the active principles. In all of these extra indices the botanical name is also given opposite each entry. Those indices should greatly aid not merely the use of the book as a means of obtaining information but also in enabling medical men to add to the knowledge of the aspect of applied—or in the case of poisonous plants misapplied—botany with which the book deals. Further assistance in this latter direction is afforded by Appendix II, which gives a schedule for supplying information and sending specimens to Professor Watt. The volume is well produced and printed, with 26 illustrations, of which 18 are of plants, 12 of these being in colour, and the remainder of cases of poisoning in domestic animals.

The reviewer cordially joins in the hope of the authors that the book will prove a stimulus to medical practitioners in Southern Africa to record cases of poisoning by plants which come their way. Although the work has been considered here more particularly as it is likely to appeal to medical men in Southern Africa, it should also prove a valuable and indispensable book of reference to pharmacologists, toxicologists and others interested, wherever they may be.

A. T. Gage.

DOBELL (Clifford) [F.R.S., Protistologist to the Medical Research Council, London. Foreign Member of the R. Accademia dei Lincei, Rome. Sometime Fellow of Trinity College, Cambridge]. **Antony van Leeuwenhoek and his "Little Animals." Being Some Account of the Father of Protozoology and Bacteriology and his Multifarious Discoveries in these Disciplines. Collected, Translated, and Edited, from his Printed Works, Unpublished Manuscripts, and Contemporary Records. Published on the 300th Anniversary of his Birth.**—pp. vii+435. With 32 plates & 4 text figs. 1932. London: John Bale, Sons & Danielsson, Ltd. 83-91 Great Titchfield Street, W.C.1. [31s. 6d.]

Standing in the Old Kirk of Delft, the reviewer once overheard a sight-seer thus address a companion who had paused in passing Leeuwenhoek's tomb—"O, come on! Who ever heard of *him*!" In the hope of lightening the darkness of those who know and care nothing about Leeuwenhoek, and of those more despicable persons who knowing little about Leeuwenhoek write at great length, Mr. Dobell has put together this wonderful volume on a self-taught shopkeeper whom he pronounces, with due proof given, the Father of Protozoology and Bacteriology.

The author was first led to a study of his quaint master by the amazing discovery that the organisms of every group that he, the author, set himself to investigate—protozoa in infusions, protozoa of frogs, spirochaetes, intestinal protozoa of man—had first been seen and described by Leeuwenhoek. But when he attempted to learn something more of the old Hollander from those who claimed to know, he found little more than a maze of inaccuracies and contradictions. No two writers, Mr. Dobell tells us, give the same account of him—even when copying from one another. He found, too, that Leeuwenhoek's "original" Latin texts could not have been written by Leeuwenhoek for the Hollander knew no language except his own. So despairing of finding truth in any easier fashion, the author set himself the stupendous task of learning seventeenth-century Dutch, and also made himself something of a palaeographer. Thus equipped, he collated and translated all Leeuwenhoek's known writings, published and unpublished, on protozoology and bacteriology including the originals in the Royal Society's collection, and reproduces them here in simple English such as Leeuwenhoek might have used had he written in that tongue. These translations are given in full, copiously annotated and explained in the light of modern protozoological and bacteriological knowledge. Nothing less than actual study of this volume can give any adequate idea of the extent and minuteness of the author's researches, not only on Leeuwenhoek's discoveries but on the man himself, his life and the times in which he lived. Leeuwenhoek's name, the form of Dutch he employed, his microscopes and microscopical methods, his draughtsmen, his portraits, are each the subject of a separate and authoritative section, while the beautifully reproduced plates of M.S. facsimiles, portraits, etc., add greatly to the value and interest of the work.

No one with any interest in the history of science, or in history for its own sake, should fail to read this fascinating account of an extraordinary man; an account, moreover, which stands out as a model of exact, laborious and indefatigable research.

W. P. MacArthur.

SERGEANT (Edmond) & **SERGEANT** (Etienne). **L'armée d'Orient délivrée du paludisme.** Préface du Dr. ROUX.—92 pp. With numerous illustrations. 1932. Paris: Masson et Cie. [25 fr.]

This small volume tells in a breezy style how the French Army in Salonica was saved in 1917 from a repetition of the débâcle of 1916. In 6 months of the latter year there were 60,000 cases of malaria and by the autumn a bare 20,000 men remained in the line. General Sarraill writes: "Mon armée est immobilisée dans les hôpitaux." A year later he is able

to boast: "There has been much less fever than last year—three times less amongst our 180,000 troops than amongst the British with only 120,000."

Probably such a statement would not face the batteries of the modern statistician, but, at least, it betrays an amiable satisfaction on the part of the Commander-in-Chief.

The book relates how this sanitary revolution took place. No effort is made to give details; it is a human document consisting of brief episodes embellished by thumb-nail sketches in black and white, which one may read with pleasure in a deck chair on a hot afternoon.

In the twinkling of an eye a Staff Officer is converted to the worship of Hygeia, a village outlawed for its splenic index, the smiles of a lusty trooper turned to tears at the vision of wife and children bereft by his neglect of quinine and mosquito net.

A Mission is appointed to carry the gospel of sanitation. Quinine, mosquito nets, healthy camping grounds—such is the trinity of salvation which they preach. But especially quinine, which enables a man to defy the parasite and keep in the line.

Behind them is the whole power of military discipline—to evade the daily dose is equivalent to desertion in the face of the enemy. And ever on the track of such defaulters the Mission harries the troops with Tanret's solution. No one is safe—into the trenches, rest billets and battery emplacements they go with their test tubes and pipettes, demanding immediate delivery of adequate samples. There is a note of pathos in the plaint: "A tout moment revenait son surnom: 'La grande . . . urineuse?'"

But alas, human nature being what it is, even Medical Officers do not always share this enthusiasm for standard prevention. Evidently the French doctors in Salonica were no exception, for at the end of September, 1917, we find them being heavily reprimanded in an Army Order for voicing a certain lack of confidence in the measures which had been adopted—"The Orders are to be carried out without discussion." *C'est la guerre!*

We may, however, congratulate the authors upon the high measure of success which they claim.

S. H. Daukes.

EDGE (P. Granville) [Division of Epidemiology and Vital Statistics, London School of Hygiene and Tropical Medicine]. **Vital Records in the Tropics.**—pp. xi + 167. With 1 plate & 9 figs. 1932. London: George Routledge & Sons, Ltd., Broadway House, 68-74, Carter Lane, E.C. [7s. 6d.]

This book is reviewed in *Bulletin of Hygiene*, 1932, Vol. 7, p. 535.

INDEX OF AUTHORS OR SOURCES.

The bracketed abbreviations after the page numbers indicate the subjects.
Page numbers within brackets indicate papers not summarized.

Am. signifies	Amoebiasis and Amoebic	Lep. signifies	Leprosy.
Bb.	Dysentery.	Lept.	Leptospirosis.
Bl.	Beriberi and Epidemic Dropsy.	Mal.	Malaria.
B.R.	Blackwater.	Misc.	Miscellaneous.
Chl.	Book Review.	Myc.	Tropical Mycology.
C.Bu.	Cholera.	Oph.	Tropical Ophthalmology.
Der.	Climatic Bubo and Lympho- granuloma Inguinale.	Pel.	Pellagra.
Dys.	Tropical Dermatology.	Pl.	Plague.
Fev.	Dysentery (Bacillary and Unclassed).	Rab.	Rabies.
G.V.	Fevers.	R.B.F.	Rat-Bite Fever.
Hel.	Granuloma Venereum.	R.F.	Relapsing Fever and other Spirochaetoses.
Hist.	Helminthiasis.	Sp.	Sprue.
H.S.	Historical.	S.S.	Sleeping Sickness.
K.A.	Heat Stroke.	Und.	Undulant and Abortus Fever.
Lab.	Kala Azar.	Y.F.	Yellow Fever.
	Laboratory Reports.	Y. & S.	Yaws & Syphilis.
		Z.	Medical Zoology.

A

- Aalsmeer, W. C., 614, (618) (Bb.)
— & Richter, C. S., 92 (Bb.)
Aars, C. G., 276 (Der.)
— & Nielsen, F. O., 387 (Y. & S.)
Abadjieff, B., 602, 603 (Rab.)
Abbatucci, S., (538) (Misc.), 744 (Hel.)
Abrahams, A., 248 (B.R.)
Abrami, P., Grégoire & Wallich, R., 499
(K.A.)
Abuel, J. I., with Cruz & Samson, 549 (Lep.)
Achundow, I., 475, 480 (Z.)
Acton, H. W., 803 (Misc.)
— & McGuire, C., 273 (Der.)
Adams, J. M., 351 (Mal.)
Adant, M., 269, 850 (Lep.), 702 (Mal.)
Adelheim, R., 603 (Rab.)
Adler, S. & Theodor, O., 103, 505, 872 (K.A.)
Advier, 40 (Hel.), (93) (Bb.), 678, 679 (Pl.)
Africa, C. M., 425 (Hel.), 862 (Der.)
Agostini, A., 323 (Myc.)
Aguessy, C. D., with Pettit, 576 (Y.F.)
Ahuja, M. L., with Maitra, 170 (Z.), 380,
381 (Chl.)
Aida, T., with Kiribayashi, 682 (Chl.)
Aitken, I. M. M., 283 (S.S.)
Akashi, K., with Nomura, 442 (Fev.)
Akil-Mouktar, 39 (Hel.)
Alain, with Guyomarc'h & Toullec, 703 (Mal.)
—, with Toullec, 637 (S.S.)
—, with — & Jolly, (364) (Mal.)
Albert, J., 611 (Bb.)
Alessandrini, A., Pampana, E. & Sabatucci,
M., 398 (B.R.)
Alessandrini, M., (720) (Mal.)
Alessandro, A., 714 (Mal.)
Alexcieff, A., (259) (Am.)
Amagasaki, M., with Kobayashi, 844 (Lep.)
Ambrogio, A., 553 (Lep.)
Amies, C. R., with Kingsbury, 359, (720)
(Mal.)
Amsterdam : Bureau d'Encouragement pour
l'Emploi de la Quinine, 346 (Mal.)
Anazawa, K., 340 (Mal.)
Anders, H. E., 390 (C.Bu.)
—, with Meyer, 729 (C.Bu.)
Anderson, C., 557 (R.F.)
—, with Nicolle, 556 bis, (565) (R.F.)
—, with — & Laigret, 557 (R.F.)
Anderson, D., 476, 477 (Z.)
Anderson, H. H., (86) (Hel.)
—, with David, Koch & Leake, 473 (Z.)
— & Reed, A. C., (259) (Am.)
—, with —, David & Leake, 583 (Am.)
Anderson, L. A. P., 183 (Lab.)
Anderson, N. P. & Ayres, S., Jr., 278 (Der.)
—, with — & Youngblood, 326 (Myc.)
— & Spector, B. K., 570 (R.B.F.)
Anderson, R. J., with Uyei, 552 (Lep.)
Anderson, W. E., 255 (Am.)
Anding, C. & Sinani, A., 99 (Pel.)
Ando, K., Kurauchi, K. & Nishimura, H.,
369 (Pl.)
Andre, Z., 502 (K.A.)
Andrews, J., 353 (Mal.)
Angelo, A., with Joannides & Papageor-
ghiou, 329 (Myc.)
Anglade, Gaudin, O. & Arcony, 408 (Hel.)
Annales de Médecine et de Pharmacie
Coloniales, 89 (Bb.)

- Annecké, S., with Schöffner, Swellengrebel & de Meillon, 693 (Mal.)
 —, with Swellengrebel & de Meillon, (364) (Mal.)
 Antonelli, G., (259) (Am.)
 Antwerp, 811 (Misc.)
 Aoki, T., 265 (Lep.)
 Appel, (375) (Pl.)
 Aragão, H. de B., 201, 573 (Y.F.)
 de Araujo, E., 91 (Bb.), 213, (570) (R.B.F.), (725) (Y. & S.)
 de Araujo, E. L. F., (93) (Bb.)
 Arbona, A., 708 (Mal.)
 Arce, J., 797 (Fev.)
 Archer, V. W., with Morton, 417 (Hel.)
 Archibald, R. G. & Marshall, A., 44, 741 (Hel.)
 Archives des Instituts Pasteur d'Indochine, 338 (Mal.), 522 *bis* (Misc.)
 Archives de l'Institut Pasteur de Tunis, 181 (Lab.)
 Arcony, with Anglade & Gaudin, 408 (Hel.)
 Arène, with de Lagoanère, (363) (Mal.)
 Arenas, R., with Kouri, 744, 745 (Hel.)
 Arias Aranda, C., with Mazza, 117, (120) *bis* (K.A.)
 — & Rosa, A., 117 (K.A.)
 Arnaud, J. & Raybaud, A., 372 (Pl.)
 Arnaud, R., 754 (Hel.)
 Artamonov, A. S., 119 (K.A.)
 Arthus, M., 161 *bis*, 492, 854 (Z.)
 Ashford, B. K., 3, 7 (Sp.), 526 (Misc.), (863) (Der.)
 —, with Kesten, Benham, Emmons & Moss, 860 (Der.)
 — & Pons, J. A., 462 (Sp.)
 Ashley, J. N., with Browning, Cohen & Gulbransen, 659 (S.S.)
 Aslett, E., with Willoughby, (120) (K.A.), 800 (H.S.)
 Assali, J., 43 (Hel.)
 Assatourow, A. G., 746 (Hel.)
 Asselin (362) (Mal.)
 Atkey, O. F. H., 226, 805 (Misc.), 555 (R. F.)
 Aubertin, C., (720) (Mal.)
 Aubin & Nadessin, 81 (Hel.)
 Auchincloss, H., 78 (Hel.)
 Auclair, J., with Levaditi & Vaisman, 561 (R.F.)
 Audain, L., with Coutelen, 46 (Hel.)
 Augagneur, 278 (Der.)
 Aujesky, A., 607 (Rab.)
 d'Aunoy, R. & Beven, J. L., 193 (Rab.)
 Austin, C. J., 263 *bis*, 543 (Lep.)
 Avari, C. R., with Naidu, 675 (Pl.)
 Aykroyd, W. R., 615 (Bb.)
 Ayres, S., Jr., with Anderson, 278 (Der.)
 —, — & Youngblood, E. M., 326 (Myc.)
 Ayuyao, C. D., with Ubaldo, 857 (Oph.)
 Azmy, S., 411 (Hel.)
- B**
- Babiet, J., (720) (Mal.)
 — & Marneffe, H., 598 (Rab.)
 Bach, F. W., 580 (Am.)
 Bachman, G. W. & Rodriguez-Molina, R., 761 (Hel.)
- Bacigalupo, J., 54, (432), 746 (Hel.)
 Badger, L. F., 264 (Lep.)
 —, with Ceder, Dyer & Rumreich, 447 (Fev.)
 —, with Dyer, Ceder, Lillie & Rumreich, 446 (Fev.)
 —, with —, — & Rumreich, 16, 446 (Fev.)
 —, with —, —, Workman & Rumreich, 447 (Fev.)
 —, with — & Rumreich, 444 (Fev.)
 —, with —, Workman, Ceder & Rumreich, 777 (Fev.)
 —, with —, Workman & Rumreich, 777 (Fev.)
 Baer, J. G., with Joyeux, 405 (Hel.)
 —, with — & Houdemer, 749 (Hel.)
 Bailby, J., 90 (Bb.)
 Bailly, J., with Remlinger, 189, 193, 194, 596, 597, 599, 607 *ter* (Rab.)
 —, with — & Manouélian, 605 (Rab.)
 —, with — & Palmowitch, 189, 190, 192 *bis* (Rab.)
 Baily, J. D., with Covell, 335 (Mal.)
 Baisas, F. E., (163) (Z.)
 Baize, P., with Lereboullet & Chabrun, 115 (K.A.)
 Baker, C. E., 492 (Z.)
 Baldwin, A. H., 803 (Misc.)
 Balfour, M. I., 516 (Misc.)
 Ball, G. H., 820 *bis* (Z.)
 Ballif, L., with Ciuca & Balteanu, 354 (Mal.)
 — & Ornstein, I., 622 (Pel.)
 Balozet, L., 327 (Myc.)
 —, with Nicolle, 598 (Rab.)
 Balteanu, I., with Ciuca & Ballif, 354 (Mal.)
 Banerjee, R., with Brahmachari, U. & Brahmachari, P., 661 (Bl.)
 Banerji, N. D., 235 (Misc.)
 Banks, W. B. C., 460 (Und.)
 Barbeau, L. G., 180 (Lab.)
 Barber, M. A., 689 (Mal.)
 — & Olinger, M. T., 331 (Mal.)
 —, Rice, J. B. & Brown, J. Y., 686 (Mal.)
 Barberi, R., 52 (Hel.)
 Bardet, J., with Levaditi, Tchakirian, & Vaisman, 291 (S.S.)
 Barlow, C. H., 36 (Hel.)
 Barneoud, J., (432) (Hel.)
 Baroni, V. & Michail, D., 435 (Oph.)
 Barraud, P. J., (163) (Z.)
 — & Christophers, S. R., (163) (Z.)
 —, with —, 136 (Z.)
 Barreto, C., (362) (Mal.)
 Barrett, J. W., 847 (Lep.), 857 (Oph.)
 Barrett, R. E., 282 (S.S.)
 Barsukowa, O., with Lenskaja, Egorow, Siwolobow, Larionowa, Marjina, Lebedewa, & Dikow, 375 (Pl.)
 Basu, B. C., with Knowles & Gupta, 592 (B.R.)
 Basu, N. K., 313 (Misc.)
 Bath, C. H., 130 (Z.)
 Battistini, T., 30 (Fev.)
 Bauer, J. H., 197, 574 (Y.F.), 204 (Lept.)
 Bauer, W., with Marble, 6 (Sp.)
 Baumgartner, E. A. & Hubbard, R. S., 9, 10 (Sp.)
 —, with Thomas, 467 (Sp.)

- Bauvallet, H., 225 (Misc.)
 Baylis, H. A., 408, 416 (Hel.)
 Bearup, A. J., 63 (Hel.)
 Beauchesne, H., with Laederich, Levaditi & Mamou, 730 (C.Bu.)
 Becker, F. E., (458) (Fev.)
 Becker, G., 50 (Hel.)
 Bédier, E., with Nattan-Larrier & Noyer, 651 (S.S.)
 Beeuwkes, H. & Hayne, T. B., 196 (Y.F.)
 Behdjat, H., 505 (K.A.)
 Beijnen, G. J. W. K., 462 (Sp.)
 Beintema, K., 272 (Der.)
 Belfanti, S., (93) (Bb.)
 Benarroch, E. I., 342 (Mal.), 593 (B.R.)
 Benavides, J., with Clark & Dunn, 208 (R.F.)
 Benedict, F. G., with Mason, 234 (Misc.)
 Benham, R. W., with Kesten, Ashford, Emmons & Moss, 860 (Der.)
 Benhamou, E., Gille, R. & Nouchy, A., 115 (K.A.)
 Bensaude, R. & Lambling, A., (393) (C.Bu.)
 Bequaert, J. C., with Strong & Cleveland, 484 (Z.)
 Berberian, D. A., with Yenikomshian, 755 (Hel.)
 v. Berkesy, L., (362) (Mal.)
 Bernard, P. N., 609 (Bb.)
 Bernasconi, V., with Mazza, Niño, & Quintana, (330) (Myc.)
 Beron, B., 274 (Der.)
 Berry, G. P. & Kitchen, S. F., 571 (Y.F.)
 Besançon, J., with Labbé, Boulin & Petresco, 328 (Myc.)
 Bessemans, A. & Thiry, U., (205), (568) (Lept.)
 Bessonowa, A., 375 (Pl.)
 Beunders, B. J. W., 561 (R.F.)
 Beven, J. L., with d'Aunoy, 193 (Rab.)
 Bevier, G., with Peña Chavarría & Serpa, 202 (Y.F.)
 Bhandari, A. D., 849 (Lep.)
 Bhatia, B. B., with Vyas, (721) (Mal.)
 Biggam, A. G., (362) (Mal.)
 —, Halawani, A. & Ragab, A., 256 (Am.)
 — & Ragab, A., (259) (Am.)
 Bishop, E. L., with Keller & Leathers, 737 (Hel.)
 Blackie, W. K., 61, 401 (Hel.), 314 (Misc.)
 Blacklock, D. B., 820 (Z.)
 — & Lourie, E. M., 110 (K.A.)
 — & Southwell, T., 165 (B.R.)
 Blanc, G. & Caminopétros, J., 21, 22 *bis*, 23 *bis*, 24, 458, 793 (Fev.), 110 (K.A.)
 Blanchard, M., (213) (R.F.), 285 (S.S.)
 —, with Olmer & Botreau-Roussel, (260) (Am.)
 Blanchard, V., with Turner, 98 (Pel.)
 Blaschin, A. N., 37 (Hel.)
 Bliss, S., 97 (Pel.)
 Blohina, Z. A., with Kostyleff, 33 (Hel.)
 Boas, A., with Buschke & Vasarhelyi, 388 (C.Bu.)
 Bobes, S., 193 (Rab.)
 Boez, L., Guillermin, J. & Marneffe, H., 267 (Lep.)
 Boggian, B., 537 (Misc.)
 Boisseau, R., with Vaucel, 286 (S.S.)
 —, with — & Salaun, 597 (Rab.)
 Bokalo, A., Wedischtschew, S., Sabinin, A., Jegorow, A. & Grikurow, W., 679 (Pl.)
 Bombay, 183 (Lab.)
 Bonacci, H., (306) (S.S.)
 Bonalberti, E., (362) (Mal.)
 Boncinelli, U., with Reitano, (795) (Fev.)
 Bonelli, P., (86) (Hel.)
 Bongiovanni, V., (458) (Fev.)
 Bonne, C., 532 (Misc.)
 —, Kouwenaar, W., Müller, H. & Vos, J. J. T., 242 (Misc.)
 —, with Mulder & Sardjito, 204 (Lept.)
 Bonne-Wepster, J. & Brug, S. L., 836 (Z.)
 Bonnet, P., 490 (Z.)
 Bonnin, H., (320) (Misc.)
 Boquien, Y., with Troisier, (565) (R.F.)
 Bordes, L. A., 338 (Mal.)
 —, with Mesnard, (363) (Mal.)
 — & Nguyen-van-Lieng, (362) (Mal.)
 Borghi, B., with Schilling, 300 (S.S.)
 Bornand, M., with Galli-Valerio, 47 (Hel.)
 Borrego, C. & Campo Posada, A., 119 (K.A.)
 Borrien, H., with Marquézy & Monnier, 499 (K.A.)
 Bos, A., with Nieschulz, (163) (Z.)
 Bosch, W. G., (100) (Pel.)
 Botreau-Roussel, P., with Olmer & Blanchard, (260) (Am.)
 Boucher, H., 740 (Hel.)
 Boucher, L., (771) (Hel.)
 Bouffard, (244) (Misc.)
 Boulin, with Labbé, Besançon & Petresco, 328 (Myc.)
 Bourguet, A., 282 (S.S.)
 Bourguignon, G. C., 343 (Mal.)
 — & Peel, E., (362) (Mal.)
 Bousquet, A., 41 (Hel.)
 Bovet, D., 127 (Z.)
 Boyd, J. E. M., (720) (Mal.)
 Boyd, T. C., Napier, L. E. & Roy, A. C., 312 (Misc.)
 Boyé, 270 (Lep.)
 Bradford, W. L., with Miller, Jr. & McCoy, 764 (Hel.)
 Bradley, G. H., 481, 828 (Z.), 689 (Mal.)
 Brahmachari, P. & Brahmachari, U., 112 (K.A.)
 —, with — & Banerjea, 661 (Bl.)
 Brahmachari, U., Brahmachari, P. & Banerjea, R., 661 (Bl.)
 Braithwaite, E. C., 235 (Misc.)
 Branchini, B., 598 (Rab.)
 v. Brand, T., 471 (Z.)
 — & Regendanz, P., 299 (S.S.)
 Brás de Sá, with de Mello, 359 (Mal.)
 de Brauwere, P. & Lisfranc, J., 653 (S.S.)
 Brazzaville, 178 (Lab.)
 Breinl, F., (469) (B.R.)
 Breitländer, K., 329 (Myc.)
 Brennan, T. J., 612 (Bb.)
 Brewster, K. C., 252 (Am.)
 —, with Thonnard-Neumann & Moya, 324 (Myc.)
 Breyerbrandwijk, M. G., with Watt, 879 (B.R.)
 Brighenti, D., 346 (Mal.)
 Brink, C. D., (259) (Am.)
 British Empire Leprosy Relief Association, 543 (Lep.)

- British Mosquito Control Institute, 130 (Z.)
 Broc, 498, 500, (507) (K.A.)
 Brooke, P. A. & Goodale, R. H. (259) (Am.)
 Broom, J. C. & Findlay, G. M., 453 (Fev.)
 Brosius, O. T., (120) (K.A.), (863) (Der.)
 Brown, E. K. & Cleveland, A. J., 567 (Lept.)
 Brown, H. W., 58 (Hel.)
 —, with Lamson, Caldwell & Ward, 56, 407 (Hel.)
 —, with —, Robbins & Ward, 56 (Hel.)
 Brown, J., (259) (Am.)
 Brown, J. Y., with Barber & Rice, 686 (Mal.)
 Brown, P. W. & Osterberg, A. E., 256 (Am.)
 Browning, C. H., Cohen, J. B., Ashley, J. N. & Gulbransen, R., 659 (S.S.)
 —, —, Cooper, K. E. & Gulbransen, R., 294, 645 (S.S.)
 Bruck, R., 143 (Z.)
 Brug, S. L., 76 *bis*, (86), 767 (Hel.), 825 (Z.)
 —, with Bonne-Wepster, 836 (Z.)
 Brulé, 71 (Hel.)
 —, Lièvre, J. A. & Tsatsaronis, (568) (Lept.)
 Brumpt, E., 48 *bis*, 406, 412 (Hel.), 773 *bis* (Fev.)
 Brun, C., with Vaudremer & Sézary, 550 (Lep.)
 Brussin, A. M., with Kritschewski, 209 (R.F.)
 Bruyn, D., with Delamare & Gatti, 525 (Misc.)
 Buchanan, J. C. R., 275 (Der.), 617 (Bb.)
 —, with Connell, 771 (Hel.)
 Büchner, S., (771) (Hel.)
 de Buck, A., Schoute, E. & Swellengrebel, N. H., 345 (Mal.)
 —, with Swellengrebel, 357 (Mal.), 479 (Z.)
 Buckley, J. J. C., 60 (Hel.)
 de Buen, E., 832 (Z.)
 Bujanowskaja, I. S., with Jermoljewa, 356 (Mal.)
 Bulletin de l'Académie de Médecine, (320) (Misc.)
 Bulletin Office International d'Hygiène Publique, 674 (Pl.)
 Burke, A. M. B., with Hoffman & Marin, 768 (Hel.)
 Burke, G. T., (720) (Mal.)
 Burke-Gaffney, H. J. O'D., 176 (Lab.)
 Burket, J. A. (565) (R.F.)
 Burnet, E., 542 (Lep.)
 Burnet, F. M., McKie, M. & Wood, I. J., 586 (Dys.)
 Burnie, R. M., 235 (Misc.)
 Burowa, L., with Kassirsky, 619 (Pel.)
 Burowa, L. F. & Kassirsky, I. A., 670 (B.R.)
 Burton, A. W. (538) (Misc.)
 Buschke, A., Boas, A. & Vasarhelyi, 388 (C.Bu.)
 Butcher, D., with Napier & Gupta, 709 (Mal.)
 Butler, C. S., 388, (725) (Y. & S.)
 Butler, G. G., 178 (Lab.), 349 (Mal.), 384 (Y. & S.)
 —, with Summerhayes, G. M. L., 383 (Y. & S.)
 Buttiaux, R. & Sevin, A., 243 (Misc.)
 Buxton, P. A., 128, 129, 154, 838 (Z.)
 Byrne, J., 578 (Y.F.)
- C**
- Caballero y C., E., (86) (Hel.)
 Cabreza, J. & Tirona, J. P., 403 (Hel.)
 Cachera, R., with Levaditi, Ravaut & Lépine, 392 (C.Bu.)
 Caius, J. F., with Mhaskar, 162 (Z.)
 Calcutta, 228, 803 (Misc.)
 Caldwell, E. L., with Lamson, Brown & Ward, 56, 407 (Hel.)
 Caldwell, F. C. & Caldwell, E. L., 422 (Hel.)
 Caldwell, R. J., with Cushing, 445 (Fev.)
 Cambers, J. H., with Turner, 723 (Y. & S.)
 Cameron, T. W. M., 48 (Hel.)
 Cameron, W. M., with Wigmore, 114 (K.A.)
 Caminopétros, J., with Blanc, 21, 22 *bis*, 23 *bis*, 24, 458, 793 (Fev.), 110 (K.A.)
 —, with Lépine, 776 (Fev.)
 —, with — & Pagonis, 566 (Lept.)
 —, with — & Pangalos, 775 (Fev.)
 —, Phylactos, A. & Photakis, B., 727 (C.Bu.)
 Caminopetros, T., (568) (Lept.)
 Cammarata, A., 116 (K.A.)
 Campbell, H. G. M., with Napier, 700 (Mal.)
 —, with Shortt & Lal, 865 (K.A.)
 van Campenhout, J., 221 (Misc.)
 Campo Posada, A., with Borrego, 119 (K.A.)
 Campnaud, (362) (Mal.)
 Canaan, T., 266 (Lep.), 497 (K.A.)
 Canal-Feijóo, E. J., 464 (Sp.)
 —, with Mazza, (278) (Der.)
 Cannavo, L., (795) (Fev.)
 Cannon, P. R., with Taliaferro & Goodloe, 126 (Z.)
 Cantacuzène, J. & Longhin, S., 550 (Lep.)
 Cany, G., (244) (Misc.)
 Cardamatis, J. P., 140 (Z.), (362) (Mal.)
 Carman, J. A., 414 (Hel.)
 Carnes, E. H., 487 (Z.)
 Carrillo, F., Fernández, J. M. M. & Schujman, S., 264 (Lep.)
 Carrión, A. L., 153, 487 (Z.)
 Carron, B., with Gaudin, 408 (Hel.)
 Carter, H. R., 245 (B.R.)
 de Carvalho, J., 822 (Z.)
 Carvalho, P. E. de O., with Vampré, 194 (Rab.)
 Caspari, J., (587) (Am.)
 Casparis, H., with Keller & Leathers, (86) (Hel.)
 Cassoute, Giraud, P. & Trabuc, F., 869 (K.A.)
 Castellani, A., 308 (Misc.), 406 (Hel.)
 de Castro, A. B., 119 (K.A.)
 Catanei, A., 323, 324 *bis* (Myc.), 859 *bis* (Der.)
 — & Legroux, C., 329 (Myc.)
 —, with Montpellier & Lefranc, 329 (Myc.), 861 (Der.)
 —, with Sergeant, Edm., Sergeant, Et. Parrot, Foley & Senevet, 332 (Mal.)
 Catsaras, J., (15) (Fev.)
 Cattán, R., with Troisier, 24 (Fev.)
 —, with — & Sifferlen, 457 (Fev.)
 Cattaneo, D., 436 (Oph.)
 Cawston, F. G., 42, 43, (86) (Hel.), (320) (Misc.), (720) (Mal.)
 Cazanove, 89 (Bb.), 571 (Y.F.), 823 (Z.)

- Ceder, E. T., with Dyer, Lillie, Rumreich & Badger, 446 (Fev.)
 —, —, Rumreich, A. & Badger, L. F., 447 (Fev.)
 —, with —, — & —, 16, 446 (Fev.)
 —, with —, Workman, Rumreich & Badger, 447 (Fev.)
 —, with —, Workman, — & Rumreich, 777 (Fev.)
 Chabrun, J., with Lereboullet & Baize, 115 (K.A.)
 Chadwick, C. R., with MacHattie, 744 (Hel.)
 —, with — & Mills, 117 (K.A.)
 —, with Mills & Machattie, 505 (K.A.)
 Chahed, L., 499 (K.A.)
 Chaillot, L. & Saunie, L., 119 (K.A.)
 Chambers, J. H., with Turner, 723 (Y. & S.)
 Chandler, A. C., 738 (Hel.)
 Chappaz & Thierry, 531 (Misc.)
 Chatterji, S. N., with Muir, 847 (Lep.)
 Chaudhury, S. G., with Chopra, 870 (K.A.)
 —, with — & De, 110 (K.A.)
 Chen, F. K., with Kurotchkin, 321 (Myc.)
 —, — & Hu, C. K., 322 (Myc.)
 Chen, S. M., van Gorder, G. W. & Yuan, Y. K., 253 (Am.)
 Ch'eng, C. C., 116 (K.A.)
 Chenoy, C. F., with Walker & Rao, 486 (Z.)
 Chesterman, C. C., 638 (S.S.)
 Ch'iang, I. H., with Chu, 406 (Hel.)
 Chiba, E. & Kuwabara, N., 124 (Z.)
 —, with Tanabe & Kuwabara, 124 (Z.)
 Ch'in, T. L., 527 (Misc.)
 Ch'in, Y. L., with Kurotchkin, 321 (Myc.)
 China Medical Journal, 261 (Lep.)
 Chinese Medical Journal, (679) (Pl.)
 Chiyuto, S. & Velasco, F., 546 (Lep.)
 Chodukin, N. J., Sofieff, M. S., Schevtschenko, F. J. & Radsivilovskij, G. L., 116 (K.A.)
 Chopra, R. N. & Chaudhury, S. G., 870 (K.A.)
 —, — & De, N. N., 110 (K.A.)
 — & Chowhan, J. S., 170, 816 (Z.)
 — & Iswariah, V., 170 (Z.)
 — & Mukherji, B., 529, 530 (Misc.)
 Chorine, V., with Marchoux, 559 (R.F.), 817 (Z.)
 Chowdhury, K. L., 136 (Z.)
 —, with Strickland, 137 (Z.)
 Chowhan, J. S., with —, 170, 816 (Z.)
 Choy, P. D. & Ludlow, A. I., 47 (Hel.)
 Christian, E. B. with Lowe, 545 (Lep.)
 Christophers, S. R., 136 (Z.)
 — & Barraud, P. J., 136 (Z.)
 —, with —, (163) (Z.)
 — & Puri, I. M., 137 (163) (Z.)
 Chu, H. J. & Ch'iang, I. H., 406 (Hel.)
 Chukerbuti, J. C., (362) (Mal.)
 Chung, H.-L., 116 (K.A.)
 Cilento, R. W. & North, E. A., 551 (Lep.)
 Ciuca, Balteanu, I. & Ballif, L., 354 (Mal.)
 Ciuca, M., (720) (Mal.)
 Ciurea, I. & Stephanescu, T., 277 (Der.)
 Clark, H. C. & Dunn, L. H., 655 (S.S.)
 —, — & Benavides, J., 208 (R.F.)
 — & Komp, W. H. W., 689 (Mal.)
 Clark, J. T., (538) (Misc.)
 Cleland, J. B., 474, 821 (Z.), (538) (Misc.)
 Clément, 185 (Lab.)
 Clemesha, W. W., 358 *bis* (Mal.)
 Cleveland, A. J., with Brown, 567 (Lept.)
 Cleveland, L. R., with Strong & Bequaert, 484 (Z.)
 Cluver, E. H., 798 (H.S.)
 Cobb, N. A., 55 (Hel.)
 Cochran, R. G., 270, 846 (Lep.)
 Codazzi Aguirre, J. A., 506 (K.A.)
 Cohen, A., (659) (S.S.)
 —, King, H. & Strangeways, W. J., (659) *bis* (S.S.)
 Cohen, J. B., with Browning, Ashley & Gulbransen, 659 (S.S.)
 —, —, with Cooper & Gulbransen, 294, 645 (S.S.)
 Colas-Belcour, J., 152 (Z.)
 —, with Roubaud, 489, 835 *bis* (Z.)
 Cole, A. C., Jr., 842 (Z.)
 Cole, H. I., 548 (Lep.)
 Collier, W. A., 292 (S.S.)
 Colombani, 371 (Pl.)
 Colombo, 736 (Hel.)
 Colombo, U., (720) (Mal.), 813 (Misc.)
 Colonie du Congo Belge, 214 (Misc.)
 Colonieu, L., 119 (K.A.)
 Combiesco, D., 456 *bis*, 794 (Fev.)
 — & Zotta, G., 455 (Fev.)
 Connell, W. K., 386 (Y. & S.)
 — & Buchanan, J. C. R., 771 (Hel.)
 Consoli, N., (362) (Mal.)
 Constantakato, G., with Livierato & Vagliano, 716 (Mal.)
 Constantinesco, N., 560 (R.F.)
 Constantinesco, V., with Nicolau & Mathis, 597 (Rab.)
 Cook, S. S., 688 (Mal.)
 Cook, W. W., 512 (Misc.)
 Cooke, W. E., with Rogers, 465 (Sp.)
 Cooper, G. W., (538) (Misc.)
 Cooper, K. E., with Browning, Cohen & Gulbransen, 294, 645 (S.S.)
 Copanaris, P., 846 (Lep.)
 Corbett, G. H. & Hodgkin, E. P., 528 (Misc.)
 Cordes, W., 63 (Hel.)
 Corfield, C. R., 319 (Misc.)
 Corinaldesi, S., 25 (Fev.)
 Cormack, E. A. (538) (Misc.)
 Cornbleet, T., 326 (Myc.)
 Cornet, E., 856 (Oph.)
 Corona, F., 498 (K.A.)
 Corpus, T., 376 *bis* (Chl.)
 Corson, J. F., 300, 634, 635 *bis* (S.S.), 837 (Z.)
 Cort, W. W., 59 (Hel.)
 —, with Foster, 762 (Hel.)
 —, with Otto, 64 (Hel.)
 —, with — & Keller, 56 (Hel.)
 — & Stoll, N. R., 416 (Hel.)
 Coulon, G. & Dinulescu, G., 150 (Z.)
 — & Sautet, J., (362), (720) (Mal.), 490 (Z.)
 Coulter, J. L. S., with Drake, (771) (Hel.)
 Coutelen, F., 53 *bis* (Hel.)
 — & Audain, L., 46 (Hel.)
 Couvy, (375) (Pl.)
 Couvy, L., 677 *bis* (Pl.)
 —, Lambert, L. & Dufour, V., 676 (Pl.)
 Covell, G., (163), 478 (Z.)

Covell, G., & Baily, J. D., 335 (Mal.)
 Cowan, T. A., 850 (Lep.)
 Craig, C. F., (587) (Am.), 770 (Hel.)
 Craven, W. J. & Co., Ltd., 361 (Mal.)
 van Creveld, S., (86) (Hel.)
 Crimmins, M. L., 169 (Z.)
 Croveri, P., (120) (K.A.)
 Crumrine, R. M. & Kessel, J. F., 534 (Misc.)
 Cruveilhier, L., with Nicolau & Kopciowska,
 601 *bis* (Rab.)
 Cruz, M. C., Abuel, J. I. & Samson, J. G.,
 549 (Lep.)
 Crur, W. O., 760 (Hel.)
 Cuboni, E., (843) (Z.)
 —, with Milani, 354 (Mal.)
 Cumming, H. S., 202 (Y.F.)
 Cummings, B. F., 842 (Z.)
 da Cunha, A. M., 507 (K.A.)
 Curry, D. P., (163) (Z.)
 Cushing, H. B. & Caldwell, R. J., 445 (Fev.)

D

Daengsvang, S., 756 (Hel.)
 —, with Foster, 762 (Hel.)
 Dardenne, 222 (Misc.)
 Dargein & Plazy, (259) (Am.)
 Dau, H., with Pijper, 452, 779 (Fev.)
 Daubney, R., with Findlay, 453 (Fev.)
 — & Hudson, J. R., 453 (Fev.)
 Davey, T. H., with Gordon, 695 (Mal.)
 David, J. C., with Iswariah, 852 (Z.)
 David, N. A., Anderson, H. H., Koch, D. A.
 & Leake, C. D., 473 (Z.)
 —, with Reed, Anderson & Leake, 583
 (Am.)
 David, V. C., 393 (C.Bu.)
 Davis, G. E. & Philip, C. B., 132 (Z.)
 Davis, N. C., 139, 836 (Z.)
 —, with Frobisher, Jr. & Shannon, 196
 (Y.F.)
 — & Kumm, H. H. W., 697 (Mal.)
 — & Shannon, R. C., 197 (Y.F.)
 Dawson, W. T. & Newman, S. P., 352 (Mal.)
 De, M. N., with Shanks, 113 (K.A.), 616 (Bb.)
 De, N. N., with Chopra & Chaudhury, 110
 (K.A.)
 de Decker, 665 (Bl.)
 Decourt, P., 352 (Mal.)
 Déjou, L., 84 (Hel.)
 De la Camara, P., 497 (K.A.)
 Delamare, G. & Gaona, R. J., (554) *bis* (Lep.)
 — & Gatti, C., 329 (Myc.), 506 (K.A.), 564,
 565 (R.F.)
 —, — & Bruyn, D., 525 (Misc.)
 —, — & Gonzalez, D., 873 (K.A.)
 Delanoë, E., 862 (Der.)
 Delanoë, P., 209, 556, 557 *bis* (R.F.)
 De la Torre, I., 429 (Hel.)
 Delbreil, J., 659 (S.S.)
 Delorme, 188 (Rab.)
 Delorme, M., with Wilbert, 157 (Z.)
 De los Rios, M., with Mazza, 119 (K.A.),
 (330) (Myc.)
 —, with — & Quintana, (278) (Der.)
 Del Ponte, E., 155 (Z.)
 Del Toro, J., Pons, J. A. & Rodríguez Molina,
 R., 78 (Hel.)

Demidowa, L. W., with Kritschewski, 561
 (R.F.)
 Denes, G., 355 (Mal.)
 Denney, O. E., 541 (Lep.)
 Deschiens, R., (587) (Am.)
 Des Essarts, J. Q., 776 (Fev.)
 — & Prade, J. V., 456 (Fev.)
 Dévé, F., 52 (Hel.)
 Dey, N. C., with Fitzgerald, 385, 722 (Y. & S.)
 Dias, E., 657 *bis* (S.S.)
 Dickinson, P. S., 564 (R.F.)
 Dikow, A., with Lenskaja, Egorow, Siwol-
 obow, Larionowa, Marjina, Lebedewa, &
 Barsukowa, 375 (Pl.)
 Dikshit, B. B., 547 (Lep.)
 — & Rao, D. K., 501 (K.A.)
 Dinger, J. E., 201 (Y.F.)
 —, Schueffner, W. A. P. & Snijders, E. P.,
 (203) (Y.F.)
 — & Snijders, E. P., 14 (Fev.)
 —, with — & Schüffner, 12 *bis* (Fev.)
 Dinulescu, G., with Coulon, 150 (Z.)
 Dixey, M. B. D., 263 (Lep.)
 Dixon, P. K., 435 (Oph.)
 Dobell, C., 881 (B.R.)
 Doering, C. R., with Earle, 423 (Hel.)
 Dollfus, R. P., with Joyeux, 53 (Hel.)
 Dombray, P., with Thiry, 757 (Hel.)
 Donatien, A., with Parrot & Lestoquard,
 504 (K.A.)
 Doorenbos, W., 682 (Chl.)
 Dorai, R., with Jolly & Fenn, 151 (Z.)
 Dorling, R., with Eccles, 276 (Der.)
 Dos Santos, R., 485 (Z.)
 Dove, W. E., 760 (Hel.)
 — & Shelmire, B., 450, 778 (Fev.)
 —, with —, 157 (Z.)
 Dowling, G. B., 326 (Myc.)
 Drake, D. C. & Coulter, J. L. S., (771) (Hel.)
 Drenowski, A. K., 709 (Mal.)
 Du, S. D., 212 (R.F.)
 Dublineau, J., with Richet, 645 (S.S.)
 Dubois, A., 290, 297 (S.S.), 546 (Lep.), 563
 (R.F.)
 —, with Rodhain, 83, 428 (Hel.)
 —, with Taramelli, 54 (Hel.)
 Ducosté, M., (720) (Mal.)
 Dufour, V., with Couvy & Lambert, 676 (Pl.)
 Dugdale, J. N., 246 (B.R.)
 Duguet, 680 (Chl.)
 Duke, H. L., 175 (Lab.), 629 (S.S.)
 Dunn, L. H., 770 (Hel.)
 —, with Clark, 655 (S.S.)
 —, with — & Benavides, 208 (R.F.)
 Duran, A., with Kraus, 596 (Rab.)
 Durand, P., 790, 791 (Fev.)
 — & Laigret, J., 457, 791 *ter* (Fev.)
 Durieux, C., 558 (R.F.)
 —, with Mathis, 555 (R.F.)
 —, with Pons, 678 (Pl.)
 Dvolaitzkaya-Barischewa, K. M., with Krits-
 chewski, 208 (R.F.)
 Dyer, R. E., Ceder, E. T., Lillie, R. D.,
 Rumreich, A. & Badger, L. F., 446 (Fev.)
 —, —, Rumreich, A. & Badger, L. F.,
 16, 446 (Fev.)
 —, with —, — & —, 447 (Fev.)
 —, —, Workman, W. G., Rumreich, A.
 & Badger, L. F., 447 (Fev.)

- Dyer, R. E., Rumreich, A. S. & Badger, L. F., 444 (Fev.)
 —, Workman, W. G., — & Rumreich, A., 777 (Fev.)
 —, —, Ceder, E. T., Badger, L. F. & Rumreich, A., 777 (Fev.)

E

- Earle, W. C., 835 (Z.)
 — & Doering, C. R., 423 (Hel.)
 Easmon, M. C. F., 263 (Lep.)
 Ebersson, F. & Mossman, W. G., 558 (R.F.)
 Eccles, C. E. & Dorling, R., 276 (Der.)
 Eckhardt, A., 526 (Misc.)
 Edge, P. G., 232 (Misc.), 882 (B.R.)
 Efremow, V., 4 (Sp.)
 Egorow, A., with Lenskaja, Siwolobow, Larionowa, Marjina, Lebedewa, Barsukowa & Dikow, 375 (Pl.)
 Eguchi, J., (587) (Am.)
 Egyptian Government, (720) (Mal.)
 Eichbaum, F., 550 (Lep.)
 Eigenberger, F., 172 (Z.)
 Eisma, M., 593 (B.R.)
 Ejercito, A., (362) (Mal.)
 Ejersito, A. & Laurel, A. G., 719 (Mal.)
 Eldin, M. S., 698 (Mal.)
 Eller, K., 716 (Mal.)
 Elliot, A. H., with Nuzum & Priest, 125 (Z.)
 Elliot, R. H., 439 *bis*, 856 (Oph.)
 Elmes, B. G. T., with Smith, 235 (Misc.)
 El-Tobgy, A. F. & Wilson, R. P., 437 (Oph.)
 Emanuels, B. J., 241 (Misc.), 443 (Fev.)
 Emmons, C. W., with Kesten, Ashford, Benham & Moss, 860 (Der.)
 Engel, A., 5 (Sp.)
 Engman, M. F., Jr. & Meleney, H. E., 254 (Am.)
 Epstein, B., (493) (Z.)
 Epstein, C. I., 68 (Hel.)
 Erber, B., 567 (Lept.)
 Erulkar, A. S., (625) (Pel.)
 Escalar, G., with Pecori, (364), (721) (Mal.)
 Escomel, E., 323 (Myc.), (863) (Der.)
 Eskey, C. R., with Mostajo & Long, 370 (Pl.)
 Esler, A. R., (278) (Der.)
 Espié, A., 73, 425 (Hel.)
 Essed, W. F. R., 829 (Z.)
 Essex, H. E. & Magath, T. B., 413 (Hel.)
 —, with Magath, 49, 413 (Hel.)
 Estas, 686 (Mal.)
 — & Sambon, M., (244) (Misc.), (363 *bis*) (Mal.)
 Estas, P., with —, 537 (Misc.)
 Etchevarne, C. & Negroni, P., 861 (Der.)
 Etinger-Tulczynska, R., 301 (S.S.)
 Eubanas, F., 267 (Lep.)
 Eusterman, G. B. & O'Leary, P. A., 95 (Pel.)
 Evans, A. M., (163), 477, 478, (493) (Z.)
 Eyraud, E., with Velu & Petitdidier, 504 (K.A.)

F

- Fabiani, G., with Pinoy, 851 (Lep.)
 Fagge, C. H., 248 (B.R.)
 Fairley, K. D., with Kellaway, 747 (Hel.)

- Fairley, N. H., 410, 427 (Hel.), 466 (Sp.)
 — & Kilner, T. P., 463 (Sp.)
 Fakhry, A., 530 (Misc.), 619 (Pel.)
 Farinaud, with Lavau, Ragiot, Souchard & Lieou, 205 (Lept.)
 Farinaud, E., with Toumanoff, (494) (Z.)
 —, — & Hoang-Thuy-Ba, (720) (Mal.)
 Farinaud, M. E., 339 (Mal.)
 Fauconnier, J., with Leger & Vassal, (244) (Misc.)
 Faust, E. C., 70 *bis*, 763 (Hel.), 126, 163 (Z.)
 229 (Misc.), 252, 257, 586 *bis* (Am.), 690 (Mal.)
 Fawcus, H. B., 512 (Misc.)
 Federated Malay States, 520 (Misc.)
 Fehmi, N., 437 (Oph.)
 Feilchenfeld, H., 730 (C.Bu.)
 Feng, L., 76, 426 (Hel.), 137 (Z.)
 Feng, L. C., with Hoeppli, 129 (Z.)
 Fenn, V. W., with Jolly & Dorai, 151 (Z.)
 Fernandez, J., with Niño & Palant, (278) (Der.)
 Fernández, J. M. M., with Carrillo & Schujman, 264 (Lep.)
 Ferradas, M. G. & Toscano, J. M., 118 (K.A.)
 Ferrier, P., 271 (Lep.)
 Feyte, R., 558 (R.F.)
 de Feyter, C., 686, 703 (Mal.)
 Fialho, A., 861 (Der.)
 Fieschi, A., (432) (Hel.)
 Findlay, G. M., 453 (Fev.), 725 (C.Bu.)
 —, with Broom, 453 (Fev.)
 — & Daubney, R., 453 (Fev.)
 — & Hindle, E., 201 (Y.F.)
 Fischer, A. W. & Schmidt-La Baume, 729 (C.Bu.)
 Fischer, O., (363) (Mal.), 508 (Misc.)
 —, with Mühlens, 706 (Mal.)
 Fischl, F., (363) (Mal.)
 Fischl, V. & Schlossberger, H., 733 (B.R.)
 Fisher, L. C., 783 (Fev.)
 Fisk, G. H., (363) (Mal.)
 Fitzgerald, G. H. & Dey, N. C., 385, 722 (Y. & S.)
 FitzGibbon, H. E., 316 (Misc.)
 Fleming, W. D., with Holt & Kintner, 795 (Fev.)
 Fletcher, L. R., 252 (Am.)
 Foley, H., 227 (Misc.)
 —, with Sergeant, Edm., Sergeant, Et., Parrot, Catanei & Senevet, 332 (Mal.)
 Fonquernie, (375) *bis* (Pl.)
 Fonquernie, J., (375), 674 *bis* (Pl.), 839 *ter* (Z.)
 da Fonseca, F., with Monteiro & Prado, 448 (Fev.)
 da Fonseca, O., 330 *bis* (Myc.)
 — & da Rosa, A. F., 324 (Myc.)
 Foster, A. O. & Cort, W. W., 762 (Hel.)
 — & Daengsvang, S., 762 (Hel.)
 Fourche, J. A. & Haveaux, G., 305 (S.S.)
 Fox, C., 153 (Z.)
 Fralic, H. B., 621 (Pel.)
 Franchini, G. & Ganora, R., (363) (Mal.)
 Francis, E., 675 (Pl.)
 Franco, E. E. & Manai, A., 869 (K.A.)
 Franklin, R. H., with Low, 501 (K.A.)
 Frazier, C. N., with Hu, C., 724 (Y. & S.)
 Freeborn, S. B., 833 (Z.)

Freeman, W., (363) (Mal.)
 Frei, W., 731 (C.Bu.)
 Freise, F. W., 271 (Lep.)
 Freund, H. & Reiss, F., 390 (C.Bu.)
 Fried, E., with Laigret, 558 (R.F.)
 Friend, N. B., 798 (H.S.)
 Frobisher, M. Jr., 199, 200, 577 (Y.F.)
 —, Davis, N. C. & Shannon, R. C., 196 (Y.F.)
 —, with Sawyer, (579) (Y.F.)
 —, with Shannon, (164) (Z.)
 — & Shannon, R. C., 396 (Misc.)
 Fróes, H. P., 70 (Hel.), 275, 861 (Der.)
 Frolowa, W. T., with Platonow, 738 (Hel.)
 Fronville, 518 (Misc.)
 Fujisawa, Y., with Kimura & Misugi, 785 (Fev.)
 Fulconis (375) (Pl.)
 Fülleborn, F., 73, 83, 405, 425, 740, 751 (Hel.), (469) (B.R.), 476 (Z.)
 Fuller, C. & Mossop, M. C., 145 (Z.)

G

Gabaldon, A., (163) (Z.)
 Gabriélides, A., 856 (Oph.)
 Gaide, 159 (Z.)
 — & Marquand, 803 (Misc.)
 Galanowa, N. W., with Lebedewa, 562 (R.F.)
 Galea, M., 194 (Rab.)
 Galletti, D., (363) (Mal.)
 Galliard, H., 397 (Misc.), 429 (Hel.), 475, 477 (Z.)
 Galli-Valerio, B. & Bornand, M., 47 (Hel.)
 Ganguly, R., with Nandi, 62 (Hel.)
 Ganora, R., with Franchini, (363) (Mal.)
 Gaona, R. J., with Delamare, (554) *bis* (Lep.)
 Garcia de Cosa, C., 812 (Misc.)
 Gardiner, M. L., with Miller, 748 (Hel.)
 Garin, C. N., Rousset, J. & Gonthier, B., 39, 756 (Hel.)
 Garrod, L. P., with Stone, 327 (Myc.)
 Gaschen, H., with Roubaud, 141, 828 (Z.)
 Gater, B. A. R., 842 (Z.)
 — with Green, 337 (Mal.)
 Gatti, C., with Delamare, 329 (Myc.), 506 (K.A.), 564, 565 (R. F.)
 —, with — & Bruyn, 525 (Misc.)
 —, with — & Gonzalez, 873 (K.A.)
 Gaudin, O., with Anglade & Arcony, 408 (Hel.)
 — & Carron, B., 408 (Hel.)
 Gay-Prieto, J., 731 (C.Bu.)
 Gébel, G., 62 (Hel.)
 Geneeskundig Tijdschrift voor Nederlandsch-Indië, 184 (Lab.), 523 (Misc.)
 Genevray, J., with Mesnard, 684 (Chl.)
 George, P. V., with King, Mankikar & Jesudasan, 151 (Z.)
 Gérard, P., Moissonnier & Welti, 577 (Y.F.)
 Germain, with Plazy, 792 (Fev.)
 —, with — & Marcandier, 115 (K.A.)
 —, with —, — & Pirot, 21 (Fev.)
 —, with — & Plazy, M. 792 (Fev.)
 Gharpurey, K. G., 169 *bis*, 853 (Z.)
 Ghiron, M., 668 (Bl.)
 Ghosal, J. N., (868) (Bl.)
 Ghosh, B., 835 (Z.)

Ghosh, P. K., 432 (Hel.)
 Gibson, P. L., 725 (C. Bu.)
 Gilks, J. L. (388) (Y. & S.)
 —, with Orr, 233 (Misc.)
 Gill, C. W. H., 304 (S. S.)
 Gillan, R. U., (388) (Y. & S.)
 Gille, R., with Benhamou & Nouchy, 115 (K.A.)
 Gingold, N., with Nicolau, (364) (Mal.)
 Gingrich, W., 818 (Z.)
 Girard, 375 (Pl.)
 Girard, G. (375) (Pl.)
 — & Hérivaux, A., 371 (Pl.)
 —, Robic, J. & Hérivaux, A., 839 (Z.)
 Giraud, P., 872 (K. A.)
 —, with Cassoute & Trabuc, 869 (K.A.)
 Girges, R., 44 *bis*, 410, 740, 742 (Hel.)
 Glusman, M. P., Gorfunkel, D. M. & Ssolowiewa, J. W., 195 (Rab.)
 Gobert, E., 671 (Pl.)
 Gohar, M. A., 269 (Lep.)
 Goldberg, M. & Pijper, A., 275 (Der.)
 Gold Coast, 178 (Lab.)
 Gomes, J. M., 268 (Lep.)
 Gonthier, B., with Garin & Rousset, 39, 756 (Hel.)
 Gonzalez, D., with Delamare & Gatti, 873 (K.A.)
 Goodale, R. H., with Brooke, (259) (An.)
 Goodloe, S., with Taliaferro & Cannon, 126 (Z.)
 Goodpasture, E. W., 576 (Y.F.)
 —, with de Monbreun, 393, 395 (G.V.)
 Gopsill, W. L., 41 (Hel.)
 van Gorder, G. W., with Chen & Yuan, 253 (Am.)
 Gordon, J., 191 (Rab.)
 Gordon, R. M., 409 (Hel.)
 — & Davey, T. H., 695 (Mal.)
 Gore, K. B., 771 (Hel.)
 Gorfunkel, D. M., with Glusman & Ssolowiewa, 195 (Rab.)
 Gothoskar, S. B., 320 (Misc.)
 Goto, T., 743 (Hel.)
 Goutschwitz, A. W., with Potapenko, 55 (Hel.)
 Gowans, F. J., 255 (Am.)
 Goyanes, J., with Pittaluga, (433) (Hel.)
 Grace, A. W. & Grace, F. B., 73 (Hel.)
 Graham, J. D., 228 *bis* (Misc.), 373 *bis* (Pl.)
 Grant, H. G., Newman, B. M. & Wood, P. D., 836 (Z.)
 Grantham-Hill, C., 274 (Der.)
 Grasset, E. & Zoutendyk, A., 171 (Z.), (538) (Misc.)
 Grasso, R., 251 (Am.)
 Graubner, F., 759 (Hel.)
 Green, A. K., with Heydon, 32 (Hel.)
 Green, R., 702, 707, 718 (Mal.)
 — & Gater, B. A. R., 337 (Mal.)
 Green, R. T. B., 127 (Z.)
 Greenwood, F. G., 395 (G. V.)
 Grégoire, with Abrami & Wallich, 499 (K.A.)
 Griffiths, T. H. & Griffiths, J. J., 825 (Z.)
 Griffiths, T. H. D., with Mayne, 347 (Mal.)
 Grikurov, W., with Bokalo, Wedischtschew, Sabinin & Jegorow, 679 (Pl.)
 Groothoff, A., 713 (Mal.)
 Gruber, G. B., 62 (Hel.)

Grubmann, M. S., 250 (Am.)
 Gudger, E. W., 491 (Z.)
 Guglielmi, F., with Raybaud, 372 (Pl.)
 Guha, B. C., 96 (Pel.)
 Guha, P., 870 (K.A.)
 Guillain, G., Mollaret, P. & Lereboullet, J.,
 (100) (Pel.)
 Guillermin, J., with Boez & Marneffe, 267
 (Lep.)
 Guilliny, R., 37 (Hel.), 122 (Z.), 371 (Pl.)
 Guillon, 47 (Hel.)
 Gulati, A. N., (432) (Hel.)
 Gulbransen, R., with Browning, Cohen &
 Ashley, 659 (S.S.)
 —, with —, — & Cooper, 294, 645
 (S.S.)
 Gunn, H., 51 (Hel.)
 — & Howard, N. J., 255 (Am.)
 Gupta, B. M. D., with Knowles, 701 (Mal.)
 —, with — & Basu, 592 (B.R.)
 —, with Napier, 707 (Mal.)
 Gupta, C. R. D., 109 (K.A.)
 —, with Napier, 106 (K.A.)
 —, with — & Butcher, 709 (Mal.)
 Gupta, P. C., with Mukherjee, 234 (Misc.)
 Gupta, S. K., with Pasricha & de Monte, 315
ter (Misc.), 381, 684 *bis* (Chl.)
 Guthrie, J. B., 623 (Pel.)
 Gutiérrez V., L., 430 (Hel.)
 Guyomarc'h, Toullec & Alain, 703 (Mal.)

H

Haagen, E. & Theiler, M., 577 (Y.F.)
 de Haas, J. H., 438 (Oph.)
 Hack, P., 39 (Hel.)
 Hackett, L. W., Martini, E. & Missiroli, A.,
 832 (Z.)
 —, with — & —, 480 (Z.)
 — & Missiroli, A., 692 (Mal.)
 Haddad, E., 541 (Lep.)
 Hakki, I., 121 (Z.)
 Halawani, A., with Biggam & Ragab, 256
 (Am.)
 —, with Khalil & Hilmy, 769 (Hel.)
 Hall, M. C., (843) (Z.)
 Hamlyn-Harris, R., 14 (Fev.), 133 (Z.)
 Handbuch der Haut- und Geschlechtskrank-
 heiten, 469 (B.R.)
 Hara, M., with Ohmori, Okamoto, Nakamura
 & Kurokawa, 615 (Bb.)
 Hara, Y., 787 (Fev.), 852 (Z.)
 Harasawa, J., with Watanabe & Ono, 851
 (Lep.)
 Hargrave, W. W., 14 (Fev.), 510 (Misc.)
 Harley, G. W., 769 (Hel.)
 Harris, F., 338 (Mal.)
 Harston, M., 436 (Oph.)
 Harvey, D. & Symes, C. B., 140 (Z.)
 Hase, A., (494) (Z.)
 Hasegawa, K., 304, 305 *ter* (S.S.)
 Hashim, M., 42 (Hel.)
 Hasle, 18 (Fev.)
 Hassall, A., with Stiles, 162 (Z.)
 Hassan, A., 43 (Hel.)
 —, with Khalil, 411, 741, (722) (Hel.)
 Hasselmann, C. M., (388) (Y. & S.), 531 *bis*
 (Misc.)
 Hasselmann, C. M., with Schöbl, 723 (Y. & S.)
 Hasskó, A., 296 (S.S.)
 Hauer, A., 771 (Hel.)
 Haveaux, G., with Fourche, 305 (S.S.)
 Havens, L. C. & Mayfield, C. R., 601 (Rab.)
 Hawking, F., with Yorke & Murgatroyd, 293
 (S.S.)
 Hawley, H., 805 (Misc.)
 Hayashi, N., 786 (Fev.)
 Hay-Michel, A., (538) (Misc.)
 Hayne, T. B., with Beeuwkes, 196 (Y.F.)
 Hazato, H., with Nagayo, M., Miyagawa,
 Mitamura, Tamiya, Sato & Imamura,
 25 (Fev.)
 —, with —, Sato, Miyagawa, Mitamura
 & Tamiya, 784 (Fev.)
 —, with —, Tamiya & Mitamura, 18
 (Fev.)
 Hearne, K. G., 799 (H.S.)
 Hecht, O., 133 (Z.)
 Heckenroth, 658 (S.S.)
 Héderer, 351 (Mal.)
 Hedrich, W., 764 (Hel.)
 Hegner, R., Johnson, C. M. & Stabler, R. M.,
 584 (Am.)
 Heinemann, H., 526 (Misc.)
 Hellerström, S., 391, 393, 728 (C.Bu.)
 — & Wassén, E., 727 *bis* (C.Bu.)
 Helminthological Abstracts, 879 (B.R.)
 Helmy, M. M., with Tomb, 410 (Hel.)
 Henderson, J. M., 265 (Lep.)
 —, with Napier, 114 (K.A.)
 Henderson, I. H., 332 (Mal.)
 Hennessey, R. S. F., 316 (Misc.)
 —, with Owen, 431 (Hel.), 434, 438 (Oph.)
 Henry, A., 63 (Hel.)
 Henry, D. P., (843) (Z.)
 Henry, T. A., 712 (Mal.)
 Herbert, H., 438 (Oph.)
 Hérivaux, A., with Girard, 371 (Pl.)
 —, with — & Robic, 839 (Z.)
 — & Rahoerson, R., 259 (Dys.)
 Hermant, 223 (Misc.)
 Hermitte, L. C. D., 480 (Z.)
 Herms, W. B., 821 (Z.)
 Hernando, E., 377 (Chl.)
 Herrero Rubio, P., 499 (K.A.)
 Hesse, E., 603 *bis* (Rab.)
 Heydon, G. M., 475 (Z.)
 — & Green, A. K., 32 (Hel.)
 Hickey, G. V., (259) (Am.)
 Hickling, R. A., 71 (Hel.)
 Hicks, C. S., Matters, R. F. & Mitchell, M. L.,
 518 (Misc.)
 Hicks, E. P., 838 (Z.)
 Higazi, I., (771), (772) (Hel.)
 Higuchi, S., 204, (205) (Lept.)
 Hulferty, M. M., with Shattuck, 798 (H. S.)
 Hill, R. B. & Niño Astudillo, J., 821 (Z.)
 Hiller, W., 760 (Hel.)
 Hilmy, I. S., with Khalil & Halawani, 769
 (Hel.)
 Hindle, E., 108 (K. A.), 573, (579) *bis* (Y.F.)
 —, with Findlay, 201 (Y.F.)
 —, with Smith, 171 (Z.)
 Hinman, E. H., 475, 824 *bis* (Z.)
 —, with Matheson, 132 (Z.)
 Hino, I., 47 (Hel.)
 Hirano, H., 567 (Lept.)
 Hiroki, H., (213) (R.F.)

Hirsch, K., (205) (Lept.)
 Hirst, L. F., 366 (Pl.), 757 (Hel.)
 Hirst, S., 157 (Z.)
 Hissette, 83 (Hel.)
 Hiyeda, K., (587) (Am.), (720) (Mal.)
 Hizon, R. P., (618) (Bb.)
 Hoang-Thuy-Ba, with Farinaud & Toumanoff
 (720) (Mal.)
 Hoare, C. A., 148, 472, 815 (Z.)
 Hobson, R. P., 485 (Z.)
 Hodgkin, E. P., with Corbett, 528 (Misc.)
 Hoeppli, R. & Feng, L. C., 129 (Z.)
 — & Hsu, H. F., 405 (Hel.)
 —, with Khaw, (163) (Z.)
 Hoffman, F. L., 690 (Mal.)
 Hoffman, W. A., 72, (86) (Hel.),
 —, Marin, R. A. & Burke, A. M. B., 768
 (Hel.)
 Hoffmann, C. C., 688 (Mal.)
 Hoffmann, H., (469) (B.R.)
 Hoffmann, J. M., 238 (Misc.)
 — & Schultz, T. W., 503 (K.A.)
 Hoffmann, W. H., 542, (554) (Lep.), 579,
 (579) (Y.F.)
 Hogue, M. J., (588) (Am.)
 Holland, J. H., 698 (Mal.)
 Holt, R. L., 318 (Misc.)
 —, Fleming, W. D. & Kintner, J. H., 795
 (Fev.)
 — & Kintner, J. H., 13, 795 (Fev.), 827 (Z.)
 — & Russell, P. F., 341 (Mal.)
 —, with St. John, 441 (Fev.)
 —, with Simmons, St. John & Reynolds,
 13 (Fev.)
 van Hoof, L., 643 (S.S.)
 d'Hooghe, 312 (Misc.)
 van Hoorde, 308 (Misc.)
 Hopkins, G. H. E., with Symes, 840 (Z.)
 Hopkins, H. H., 537 (Misc.)
 Hoshizaki, S., 781 (Fev.)
 Hosono, S., with Nishibe & Miyazawa, 785,
 786 (Fev.)
 Houdemer, E., with Joyeux & Baer, 749
 (Hel.)
 Houssiau, F., (259) (Am.)
 Howard, N. J., with Gunn, 255 (Am.)
 Hsu, H. F., with Hoeppli, 405 (Hel.)
 Hsu, I. T., (259) (Am.)
 Hu, C. H., 297 (S.S.)
 Hu, C. K., with Chen & Kurotchkin, 322
 (Myc.)
 — & Frazier, C. N., 724 (Y. & S.)
 Hu, S. M. K., (432) (Hel.)
 Huart, A. J., (363) (Mal.)
 Hubbard, R. S., with Baumgartner, 9, 10
 (Sp.)
 Hudson, E. H., (720) (Mal.)
 — & Young, A. L., 230 (Misc.)
 Hudson, J. R., with Daubney, 453 (Fev.)
 Hudson, N. P., 200, 576 (Y.F.)
 Huff, C. G., 126 (Z.), 703 (Mal.)
 Hughes, M., 524 (Misc.)
 Hughes, T. A. & Shrivastava, D. L., 348
 (Mal.)
 Hughes, W. L., 434 (Oph.)
 Huinink, A. M. S. B., with Schuurman, 152
 (Z.)
 Hulse, C. R., with O'Connor, 765 (Hel.)

Hurst, E. W., 605 (Rab.)
 — & Pawan, J. L., 187, 595 (Rab.)
 Hussameddin, 420 (Hel.)

I

Icasiano, M. C. (432) (Hel.)
 Ichihara, T., with Ohtawara, 552 (Lep.)
 Iles, U. G., (100) (Pel.)
 Imagawa, Y., with Kawamura, 28, 783, 787
 (Fev.)
 —, with — & Shibata, 788 (Fev.)
 Imamura, A., with Nagayo, Miyagawa,
 Mitamura, Tamiya, Sato & Hazato, 25
 (Fev.)
 Ince, H. T. (163) (Z.)
 India, 228 (Misc.)
 Innes, F. R., 237 (Misc.)
 Ishii, N. & Tei Tok Wa, 35 (Hel.)
 Ishii, Y. & Yamashiro, R., 752 (Hel.)
 Ishioka, H., with Kamisawa, (720) (Mal.)
 Ishiware, K. K. & Ogata, N., 788 (Fev.)
 Iswariah, V., with Chopra, 170 (Z.)
 — & David, J. C., 852 (Z.)
 Iwase, Y., 853 (Z.)
 Iyengar, M. O. T., 334, 343 (Mal.), 478 (Z.)
 —, with Rao, 426 (Hel.)
 — & Sarathy, M. K. P., 823 (Z.)

J

Jack, J., 318 (Misc.)
 Jack, R. W., 147 (Z.)
 Jackson, C. H. N., 148 (Z.)
 Jacob, A., with Jame & Jude, (851) (Lep.)
 Jacques, F., 337 (Mal.)
 Jahnel, F., 211 (R. F.)
 Jamal-ud-Din, 856 (Oph.)
 Jame, L., Jacob, A. & Jude, A., (851) (Lep.)
 — & Jude, A., 769 (Hel.)
 James, C. S., 532 (Misc.)
 James, S. P., 357 *bis* (Mal.)
 —, Nicol, W. D. & Shute, P. G., 693 (Mal.)
 Jamot, E., 633 (S.S.)
 Janawoska, 437 (Oph.)
 von Jancsó, N., 291, 292, 646, 647 (S.S.)
 —, with Kroö, 240 (Misc.)
 Jansen, B. C. P., Kinnersley, H. W., Peters,
 R. A. & Reader, V., 92 (Bb.)
 Jantzen, W., 31 (Fev.), 81 (Hel.), 90 (Bb.)
 Japanese Journal of Experimental Medicine,
 270 (Lep.)
 Jeauime, G., (507) (K.A.)
 Jegorow, A., with Bokalo, Wedischschew,
 Sabinin & Grikurow, 679 (Pl.)
 Jemma, R., (363) (Mal.)
 Jermoljewa, Z. W. & Bujanowskaja, I. S., 356
 (Mal.)
 Jesudasan, F., with King, George & Mankikar,
 151 (Z.)
 Jewell, N. P., 460 (Und.)
 Jirovec, O., 126 (Z.)
 Joannides, G., Papagheorghiou, S. & Angelo,
 A., 329 (Myc.)
 Johnson, C. M., with Hegner & Stabler, 584
 (Am.)
 Jolly, with Toullec & Alain, (364) (Mal.)

Jolly, G. G., Fenn, V. W. & Dorai, R., 151 (Z.)
 Jonckheere, A., 307 (Misc.)
 Jones, S. B., 742 (Hel.)
 Journal of the Public Health Association of Japan, (382) (Chl.)
 Joyeux, C. & Baer, J. G., 405 (Hel.)
 — & Dollfus, R. P., 53 (Hel.)
 —, Houdemer, E. & Baer, J. G., 749 (Hel.)
 Jude, A., with Jame, 769 (Hel.)
 —, with — & Jacob, (851) (Lep.)
 Junès, E., 436 (Oph.)

K

Kadlez, N. & Kubarev, M., 150 (Z.)
 Kahn, B. L., 621 (Pel.)
 Kaiser, L., (86) (Hel.), 360 (Mal.)
 Kaiwa, J., 789 (Fev.)
 Kaktin, A., 191 (Rab.)
 Kaktine, A., 605 (Rab.)
 Kalajew, A. W., 211 (R. F.)
 Kamalow, N., 54 (Hel.)
 Kamisawa, O. & Ishoka, H., (720) (Mal.)
 Kandelaki, S., 361 (Mal.)
 Kapussto, M. L., 295 (S.S.)
 Kapusto, M. L., with Rubinstein, 210 (R.F.)
 Kassirsky, I. J., with Burova, L. F., 670 (B.R.)
 Kassirsky, J. & Burova, L., 619 (Pel.)
 Kastein, J., 411 (Hel.)
 Katsuta, I., 413, 746 (Hel.)
 Kauntze, W. H., 174 (Lab.)
 Kawamura, R. & Imagawa, Y., 28, 783, 787 (Fev.)
 —, Shibata, T. & Imagawa, Y., 788 (Fev.)
 Kawanishi, S., 762 (Hel.)
 Kawashima, T., with Kuroi, Suzuki, Mai & Yokoyama, 587 (Dys.)
 Kawatsurè, S., with Ota, 325 (Myc.)
 Kecht, B., (320) (Misc.)
 Keilman, W. I., 51 (Hel.)
 Kellaway, C. H., 172, 852 (Z.)
 — & Fairley, K. D., 747 (Hel.)
 — & Morgan, F. G., 852 (Z.)
 — & Williams, F. E., 172, 853 (Z.)
 Keller, A. E., 36, 417 (Hel.)
 —, Casparis, H. & Leathers, W. S., (86) (Hel.)
 —, Leathers, W. S. & Bishop, E. L., 737 (Hel.)
 —, with Otto & Cort, 56 (Hel.)
 Keller, P., 855 (Oph.)
 Kelly, R., with Routledge, (625) (Pel.)
 Kelser, R. A., 195 (Rab.)
 Kemp, A. H., 40 (Hel.)
 Kemp, H. A., 16, 779 (Fev.)
 Kenya, Colony & Protectorate of: 174 (Lab.)
 Kerby, T. R. F., 524 (Misc.)
 Kermack, W. O. & McKendrick, A. G., 107 (K.A.)
 Kerr, A. F. G., 313 (Misc.)
 Kessel, J. F., with Crumrine, 534 (Misc.)
 Kesten, B. M., Ashford, B. K., Benham, R. W., Emmons, C. W. & Moss, M. C., 860 (Der.)
 Khalil & Hassan, A., 411, 741, (772) (Hel.)
 —, Halawani, A. & Hilmy, I. S., 769 (Hel.)

Khartoum, 226 (Misc.)
 Khaw, O. K., 108 (K. A.), 404, (432) (Hel.)
 — & Hoepli, R., (163) (Z.)
 Khouri, J., 251 (Am.)
 Kikuth, W., 705 (Mal.), 796 (Fev.)
 Kilner, T. P., 582 (Am.)
 —, with Fairley, 463 (Sp.)
 Kimura, R., Fujisawa, Y. & Misugi, Y., 785 (Fev.)
 King, H., with Cohen & Strangeways, (659) (S.S.)
 King, H. H., (363) (Mal.), 805 (Misc.)
 —, George, P. V., Mankikar, D. S. & Jesudasan, F., 151 (Z.)
 — & Pandit, C. G., 486 (Z.)
 King, W. V., 479, 834 (Z.)
 King Institute of Preventive Medicine, Guindy, 805 (Misc.)
 Kingsbury, A. N., 520 (Misc.)
 — & Amies, C. R., 359, (720) (Mal.)
 Kingsbury, J., 267 (Lep.)
 Kinnersley, H. W., with Jansen, Peters & Reader, 92 (Bb.)
 Kintner, J. H., with Holt, 13, 795 (Fev.), 827 (Z.)
 —, with — & Fleming, 795 (Fev.)
 Kiribayashi, S., 378 bis (Chl.)
 — & Aida, T., 682 (Chl.)
 Kirschner, L., 242 (Misc.)
 — & Kuijer, A., 783 (Fev.)
 Kirwan, E. W. O'G., 440 (Oph.)
 Kitamura, K., 68, (86), 761 (Hel.)
 — & Nakamura, M., (772) (Hel.)
 Kitaoka, M., (205) (Lept.)
 Kitashima, T. & Watanabe, Y., 382 (Chl.)
 Kitchen, S. F. with Berry, 571 (Y.F.)
 —, with Sawyer & Lloyd, 572 (Y.F.)
 Kleine, F. K., 514 (Misc.)
 — & Krause, M., 559 (R.F.)
 Kleinmann, H., 620 (Pel.)
 Kligler, I. J., 302 (S.S.), 827 (Z.)
 — & Mer, G., 344, 360 (Mal.)
 Knowles, R. & Gupta, B. M. D., 701 (Mal.)
 —, — & Basu, B. C., 592 (B.R.)
 Kobayashi, H., 50 bis (Hel.)
 — & Amagasaki, M., 844 (Lep.)
 Koch, D. A., 124 (Z.)
 —, with David, Anderson & Leake, 473 (Z.)
 Koch, F., 551 (Lep.), 729 (C Bu.)
 Kochmann, M., 40 (Hel.)
 Kodama, M., Kono, M. & Takahashi, K., 782 (Fev.)
 —, Takahashi, G. & Kohno, M., 780 (Fev.)
 —, Takahashi, K. & Kono, M., 781 (Fev.)
 Kodama, T., (433) (Hel.), 489 bis (Z.)
 —, with Sato, 602 (Rab.)
 Kofoed, C. A. & McNeil, E., 473 (Z.)
 —, — & Kopac, M. J., 473 (Z.)
 Koh, P. K., with Murray, (588) (Am.)
 Kohno, M., with Kodama & Takahashi, 780 (Fev.)
 Koidzumi, M. & Morishita, K., 828 (Z.)
 Kolle, W., Prigge, R. & Rothermundt, M., 209 (R.F.)
 Kolmer, J. A., with Rule, A. M., 645 (S.S.)
 Kolochine, G., with Mathis & Martin-Charpenel, 575 (Y.F.)
 Komp, W. H. W., with Clark, 689 (Mal.)

Kono, M., with Kodama & Takahashi, 781, 782 (Fev.)
 Konstanosoff, S. W., (721) (Mal.)
 Konstansow, S. W., 718 (Mal.)
 Kopac, M. J., with Kofoid & McNeil, 473 (Z.)
 Kopciowska, L., with Nicolau, 600 (Rab.)
 —, with — & Cruveilhier, 601 *bis* (Rab.)
 Koppisch, E., 185 (Lab.)
 Kopstein, F., 487 *bis*, 493, 841, 853 (Z.)
 Korteweg, P. C., (363) (Mal.)
 Kostyleff, N. N. & Blohina, Z. A., 33 (Hel.)
 Kouri, P. & Arenas, R., 744, 745 (Hel.)
 Kouwenaar, W., 523 (Misc.)
 —, with Bonne, Müller & Vos, 242 (Misc.)
 Kowalzig, H., 242 (Misc.)
 Kraus, R., 790 (Fev.)
 — & Duran, A., 596 (Rab.)
 Krause, M., with Kleine, 559 (R.F.)
 Krauss, W., 689 (Mal.)
 Krijgsman, B. J. & Ponto, S. A. S., 489 (Z.)
 Krikorian, K. S., with Stuart, 190, 192, 193, 599, 607 (Rab.)
 Krishnan, B. T., with Vareed, C., 519 (Misc.)
 Krishnan, K. V., 864, 868 *bis* (K.A.)
 —, Lal, J. C. & Napier, L. E., 870 (K.A.)
 —, with Napier, 495 (K.A.)
 —, with — & Lal, 719 (Mal.)
 —, with Shortt, Smith & Swaminath, 107 (K.A.)
 Kritschewski, I. L. & Brussin, A. M., 209 (R.F.)
 — & Demidowa, L. W., 561 (R.F.)
 — & Dvolaitzkaya-Barischewa, K. M., 208 (R.F.)
 — & Rubinstein, P. L., 211 (R.F.)
 — & Ssiniuchina, M. N., (565) (R.F.)
 Krjukoff, A., (100) (Pel.)
 Kroó, H., 648 (S.S.)
 — & v. Jancso, N., 240 (Misc.)
 Kubarev, M., with Kadlez, 150 (Z.)
 Kuczynski, M. H., 578 (Y.F.)
 Kuijer, A., 794 (Fev.)
 —, with Kirschner, 783 (Fev.)
 Kuipers, F. C., 213 (R.B.F.)
 Kumer, L., 95 (Pel.)
 Kumm, H. W., 135 (Z.), 202 (Y.F.), (721) (Mal.)
 —, with Davis, 697 (Mal.)
 Kundu, S., 112 (K.A.)
 Kurauchi, K., with Ando & Nishimura, 369 (Pl.)
 Kurisu, S., 752 (Hel.)
 Kuroi, C., Suzuki, T., Mai, H., Yokoyama, Z. & Kawashima, T., 587 (Dys.)
 Kurokawa, K., with Ohmuri, Okamoto, Hara & Nakamura, 615 (Bb.)
 Kurotchkin, T. J., 114 (K.A.)
 — & Chen, F. K., 321 (Myc.)
 —, with — & Hu, 322 (Myc.)
 — & Ch'in, T. L., 321 (Myc.)
 —, with Lim & Wu, 328 (Myc.)
 —, with Reimann, 327, 328 (Myc.)
 Kurup, P. K., (163) (Z.), 329 (Myc.)
 Kuscheleff, W., 33 (Hel.)
 Kuwabara, N., with Chiba, 124 (Z.)
 —, with Tanabe, (494) (Z.)
 —, with — & Chiba, 124 (Z.)
 Kyriazides, K., with Petzatakis, (568) (Lept.)

L

Labbé, M., Boulín, Besançon, J. & Petresco, 328 (Myc.)
 —, Nepveux, F. & Nichita, 121 (Z.)
 Labernadie, V., 446 (Fev.)
 Laederich, L., Levaditi, C., Mamou, H. & Beauchesne, H., 730 (C.Bu.)
 de Lagoanère, J. M. J. L. & Arène, (363) (Mal.)
 Lagrange, E., 560 (R.F.)
 Laigret, J., with Durand, 457, 791 *ter* (Fev.)
 — & Fried, E., 558 (R.F.)
 —, with Nicolle, 774 (Fev.)
 —, with — & Anderson, 557 (R.F.)
 —, with Sellards, 572 (Y.F.)
 Lal, C., with Shortt & Campbell, 865 (K.A.)
 Lal, J. C., with Krishnan & Napier, 870 (K.A.)
 —, with Napier & Krishnan, 719 (Mal.)
 Lallemand, G. F. M. A., Soerono, M. & Soekaria, M. S., (494) (Z.)
 —, — & Stoker, W. J., 830 (Z.)
 Lambers, J. A. P. H. R., 696 (Mal.)
 Lambert, L., 672 (Pl.)
 —, with Couvy & Dufour, 676 (Pl.)
 Lambert, S. M., 875 (Misc.)
 Lambling, A., with Bensaude, (393) (C.Bu.)
 Lampe, P. H. J., 846 (Lep.)
 Lamson, P. D., Brown, H. W., Robbins, B. H. & Ward, C. B., 56 (Hel.)
 —, Caldwell, E. L., Brown, H. W. & —, 56, 407 (Hel.)
 — & Ward, C. B., 408, 739 (Hel.)
 Lancet, 749 (Hel.)
 Landauer, E., 212 *bis* (R.F.)
 Lane, C., 77, 423 (Hel.), (363) (Mal.)
 de Langen, C. D., (433) (Hel.), 717 (Mal.)
 Langworthy, O. R., 622 (Pel.)
 Laqueur, B., 873 (K.A.)
 Laquière, 263, (Lep.), (565) (R.F.), 801 *bis* (Misc.)
 Laquière, E., (554), 845 *bis* (Lep.)
 Larionowa, S., with Lenskaja, Egorow, Siwolobow, Marjina, Lebedewa, Barsukowa & Dikow, 375 (Pl.)
 Larrousse, F., (433) (Hel.)
 Lasnet, 222 (Misc.)
 Lassalle, C. F., 187 (Rab.)
 Launoy, L., Nicolle, P. & Prieur, M., 644 (S.S.)
 Laurel, A. G., with Ejersito, 719 (Mal.)
 Lavau, Ragiot, Souchard, Farinaud & Lieou, 205 (Lept.)
 de Laverigne, V., Masson, P. & Stumpf, R., (205) (Lept.)
 — & Stumpf, R., (205) (Lept.)
 Lazzaro, G., 667 (Bl.)
 League of Nations, 461 (Mal.)
 League of Nations Monthly Epidemiological Report, 365 (Pl.), 376 (Chl.)
 Leake, C. D., 580 (Am.)
 —, with David, Anderson & Koch, 473 (Z.)
 —, with Reed, Anderson & David, 583 (Am.)
 Leathers, W. S., with Keller & Bishop, 737 (Hel.)
 —, with — & Casparis, (86) (Hel.)
 Lebedewa, E., with Lenskaja, Egorow, Siwolobow, Larionowa, Marjina, Barsukowa & Dikow, 375 (Pl.)

- Lebedewa, M. N. & Galanowa, N. W., 562 (R.F.)
 Le Bourdellès, B. & Velluz, L., 356 (Mal.)
 Leclef, 664 (Bl.)
 Le Chuiton, 212 (R.F.)
 —, with Marcandier, Plazy & Pirot, 20 (Fev.)
 — & Negrie, 101 (Und.)
 Ledentu, 509 *bis*, (538) (Misc.)
 Ledentu, G., 300 (S.S.)
 Lee, S. W. T., 279 (S.S.)
 Leeson, H. S., 138 *bis*, 488, 839 (Z.)
 Lefèvre, (86) (Hel.)
 Lefranc, with Montpellier & Catanei, 329 (Myc.), 861 (Der.)
 Lefrou, G., 225 (Misc.), 277 (Der.), (259) (Am.), 671, 673 (Pl.)
 Le Gac, 206 (R.F.)
 Legendre, J., 133 (Z.)
 Leger, J. P., (721) (Mal.)
 Leger, M., 281 (S.S.), 553, 848 (Lep.), 566 (Lept.) (721) (Mal.)
 — & Sicé, A., 636 (S.S.)
 —, with —, 283 (S.S.)
 —, Vassal, P. & Fauconnier, J., (244) (Misc.)
 Legroux, C., with Catanei, 329 (Myc.)
 Le Guyon, R., 270 (Lep.)
 Lemaire, 455 (Fev.)
 Lemierre, A. & Lévesque, J., (588) (Am.)
 Lenskaja, G. N., Egorow, A., Siwolobow, W., Larionowa, S., Marjina, J., Lebedewa, E., Barsukowa, O. & Dikow, A., 375 (Pl.)
 Lentze, F. A., 194 (Rab.)
 de Leon, W., with Oliver & de Roda, 550 (Lep.)
 Leonard, C. S., with Reiner, 646 (S.S.)
 Lépine, P., 775, 776 (Fev.)
 — & Caminopetros, J., 776 (Fev.)
 —, — & Pagonis, A., 566 (Lept.)
 —, — & Pangalos, G., 775 (Fev.)
 —, with Levaditi, 313 (Misc.)
 —, with — & Marie, 210 (R.F.), 391 (C.Bu.)
 —, with —, Ravaut & Cachera, 392 (C.Bu.)
 —, with —, — & Schoen, 391, 392 (C.Bu.)
 —, Markianos, J. & Papayouannou, A., 850 (Lep.)
 Leprosy in India, 262, 540 (Lep.)
 Leprosy Review, 261 (Lep.)
 Lereboullet, J., with Guillain & Mollaret (100) (Pel.)
 Lereboullet, P., Chabrun, J. & Baize, P., 115 (K.A.)
 Lessa, G., (203) (Y.F.)
 Lestoquard, F., with Parrot and Donatien, 504 (K.A.)
 Levaditi, C., Auclair, J. & Vaisman, A., 561 (R.F.)
 —, Bardet, J., Tchakirian, A. & Vaisman, A., 291 (S.S.)
 —, with Laederich, Mamou & Beauchesne, 730 (C.Bu.)
 — & Lépine, P., 313 (Misc.)
 —, Marie, A. & Lépine, P., 210 (R.F.), 391 (C.Bu.)
 Levaditi, C., Ravaut, P., Lépine, P., & Cachera, R., 392 (C.Bu.)
 —, —, — & Schoen, R., 391, 392 (C.Bu.)
 —, — & Schoen, R., 726 *bis*, 727 (C.Bu.)
 Le-van-Xuyen, with Tirouvanziam, (364) (Mal.), 855 (Oph.)
 Levenson, E. D., 711 (Mal.), 833 (Z.)
 Lévesque, J., with Lemierre, (588) (Am.)
 Levin, I. M., with Pilot, 50 (Hel.)
 Libert, C. E. M. J., 412 (Hel.)
 Lickint, F., 820 (Z.)
 Liddo, S., 819 (Z.)
 Lie, H. P., 264 (Lep.)
 Lieou, with Lavau, Ragiot, Souchard & Farinaud, 205 (Lept.)
 —, with Souchard & Marneffe, 451 (Fev.)
 Lieurade, 536 (Misc.)
 Lièvre, J. A., with Brulé & Tsatsaronis, (568) (Lept.)
 Liggett, H., 155 (Z.)
 Lillie, R. D., 445 (Fev.)
 —, with Dyer, Cedar, Rumreich & Badger, 446 (Fev.)
 Lim, C. E., Kurotchkin, T. J. & Wu, C. J., 328 (Myc.)
 Lindberg, 458 (Fev.)
 Lindberg, K., 19 (Fev.)
 Inton, R. W. & Poindexter, H. A., 298 (S.S.)
 Liotard, M., with Oelsnitz, 498 (K.A.)
 Lipschitz, L. A., 544 (Lep.)
 Lisfranc, J., with de Brauwere, 653 (S.S.)
 Little, C. J. H., 127 (Z.)
 Little, J. L., (259) (Am.)
 Livierato, S., Vagliano, M. & Constantakato, G., 716 (Mal.)
 Lloyd, W., 399 (B.R.)
 —, with Sawyer, 198 (Y.F.)
 —, with — & Kitchem, 572 (Y.F.)
 Lodato, G., (772) (Hel.)
 Lodder, J., 844 (Lep.)
 Loeper, Soulié & Tonnet, 52 (Hel.)
 van Loghem, J. J., 681 *bis* (Chl.)
 Löhe, H. & Rosenfeld, H., 730 (C.Bu.)
 Loi, L., (363) (Mal.)
 Lombart, H., 350 (Mal.)
 —, with Wairavens, 38 (Hel.)
 Long, J. D., 370 (Pl.)
 —, with Mostajo & Eskey, 370 (Pl.)
 Longhin, S., with Cantacuzène, 550 (Lep.)
 Longo, D., (772) (Hel.)
 Lopez-Neyra, C. R., 53 (Hel.)
 Lopez Rizal, L., with Lull, 517 (Misc.)
 —, Sian, J. & Punsalang, J. V., 680 (Chl.)
 Lotze, H., (163) (Z.), 715 (Mal.)
 Lourie, E. M., with Blacklock, 110 (K.A.)
 Louveaux, L., (669) (Bl.)
 Low, G. C., 75 (Hel.)
 — & Franklin, R. H., 501 (K.A.)
 Lowe, J., 94 (Pel.), 539 (Lep.)
 — & Christian, E. B., 545 (Lep.)
 Lücke, R., 326 (Myc.)
 Ludlow, A. I., with Choy, 47 (Hel.)
 Lull, G. F., 517 (Misc.), 540 (Lep.)
 — & Lopez Rizal, L., 517 (Misc.)
 Lutrario, A., 25 (Fev.), (363) (Mal.)
 Lynch, K. M., 819 (Z.)

M

- MacArthur, W. P., 72 (Hel.)
 Macauley, T. S., 232 (Misc.)
 McCarrison, R., 396 (Misc.)
 McClendon, S. J., 125 (Z.)
 McCoy, O. R., 65, 67, 70 (Hel.)
 —, with Miller, Jr. & Bradford, 764 (Hel.)
 McCrea, A., 325 (Myc.)
 Macdonald, G., 335, (363) (Mal.)
 — & Majid, A., 333 (Mal.)
 Macdonald, I., (259) (Am.)
 McDowall, R. J. S., 400 (B.R.)
 Macfadyen, J. A., (588) (Am.)
 McGillivray, W. S., 443 (Fev.)
 McGuire, C., with Acton, 273 (Der.)
 MacHattie, C. & Chadwick, C. R., 744 (Hel.)
 — & Mills, E. A., with Chadwick, C. R. 117 (K.A.)
 —, with — & Chadwick, 505 (K.A.)
 Mackehenie, D., (31) (Fev.)
 McKendrick, A. G., with Kermack, 107 (K.A.)
 Mackie, F. P., with Naidu, 373 (Pl.)
 McKie, M., with Burnet & Wood, 586 (Dys.)
 McKinley, E. B., 74 (Hel.)
 — & Soule, M. H., 549 (Lep.)
 —, with —, 549 (Lep.)
 Mackinnon, J. E., with Talice, 322, 323 (Myc.)
 McKneely, T. B., (588) (Am.)
 McLean, N., 279, 284 (S.S.)
 McNeil, E., with Kofoid, 473 (Z.)
 —, with — & Kopac, 473 (Z.)
 Madras, 858 (Oph.)
 Madras Presidency, 685 (Chl.)
 de Magalhães, O., 160 (Z.)
 Magath, T. B. & Essex, H. E., 49 (Hel.)
 —, with —, 413 (Hel.)
 Maggiora-Vergano, R., (363) (Mal.)
 Magrou, J., Magrou, M. & Roubaud, E., 134 (Z.)
 Mai, H., with Kuroi, Suzuki, Yokoyama & Kawashima, 587 (Dys.)
 Maitra, G. C. & Ahuja, M. L., 170 (Z.), 380, 381 (Chl.)
 — & Mallick, S. M. K., 381 (Chl.)
 Majid, A., with Macdonald, 333 (Mal.)
 Majumder, A. R., (259) (Am.)
 Makar, N., 410 (Hel.)
 Malcomson, G. E. & Murthy, K. N., 3 (Sp.)
 Maldonado, A., (797) (Fev.)
 Mallick, S. M. K. & Maitra, G. C., (854) (Z.)
 —, with —, 381 (Chl.)
 Mamou, H., with Laederich, Levaditi & Beauchesne, 730 (C.Bu.)
 Manai, A., with Franco, 869 (K.A.)
 Manalang, C., 340 (Mal.), 476 (Z.), 545 bis (Lep.)
 Manca, S., 712 (Mal.)
 Mandoul, A. H., 38 (Hel.)
 Mandry, O. C., 45 (Hel.)
 Mankikar, D. S., with King, George & Jesudasan, 151 (Z.)
 Manon, 852 (Z.)
 Manouélian, with Remlinger & Bailly, 605 (Rab.)
 Manoussakis, E., 312 (Misc.), 662 (Bl.)
 Manson-Bahr, P., 581, 582 (Am.), 639 (S.S.), 710 (Mal.), 860 (Der.)
 Manwell, R. D., 710 (Mal.)
 Maplestone, P. A., 759 (Hel.)
 — & Mukerji, A. K., 414, 417 (Hel.)
 Marble, A. & Bauer, W., 6 (Sp.)
 Marcandier & Pirot, R., 450, 777 (Fev.), 487 (Z.)
 —, with Plazy & Germain, 115 (K.A.)
 —, with —, — & Pirot, 21 (Fev.)
 —, with —, Le Chuiton & Pirot, R., 20 (Fev.)
 Marchoux, E., 348 (Mal.)
 — & Chorine, V., 559 (R.F.), 817 (Z.)
 Mariani, M., 270 (Lep.)
 Marie, A., with Levaditi & Lépine, 210 (R.F.), 391 (C.Bu.)
 Marie, A. C. & Urbain, A., 195 (Rab.)
 Marin, R. A., (259) (Am.)
 —, with Hoffman & Burke, 768 (Hel.)
 Marjina, J., with Lenskaja, Egorow, Siwolobow, Larionowa, Lebedewa, Barsukowa & Dikow, 375 (Pl.)
 Markianos, J., (554) (Lep.)
 —, with Lépine & Papayouannou, 850 (Lep.)
 Marmo, A., 308, 310 (Misc.), 455 (Fev.), 507 (K.A.)
 Marneffe, H., with Bablet, 598 (Rab.)
 —, with Boez & Guillermin, 267 (Lep.)
 —, with Souchard & Lieou, 451 (Fev.)
 Marquand, with Gaide, 803 (Misc.)
 Marque, (375) (Pl.)
 de Marqueissac, H., 636, 640, 654 (S.S.)
 Marquézy, R. A., Monnier & Borrien, H., 499 (K.A.)
 Marseille-Médical, 459 (Und.)
 Marshall, A., with Archibald, 44, 741 (Hel.)
 Marshall, J. F., 130 (Z.)
 Martin, G., 281 (S.S.)
 Martin, J. T., (100) (Pel.)
 Martin, R. & Monier, H. M., 284 (S.S.)
 Martin-Charpenel, G. with Mathis & Kolochine, 575 (Y.F.)
 Martini, E., 345, 349, 361 (Mal.), 469 (B.R.), (494) (Z.)
 —, with Hackett & Missiroli, 832 (Z.)
 —, Missiroli, A. & Hackett, L. W., 480 (Z.)
 Martodiwirio, R. S. & Thierfelder, M. U., 587 (Dys.)
 Marwits, E. L. & van Steenis, P. B., 254 (Am.)
 Marzinowsky, E. J., 644 (S.S.)
 Mascall, A. J., 516 (Misc.)
 Más de Ayala, I., 206 (R.F.)
 Mason, E. D. & Benedict, F. G., 234 (Misc.)
 Mason, M., 246 (B.R.)
 Massie, E., with Miller, 415 (Hel.)
 Masson, P., with de Laverne & Stumpf, (205) (Lept.)
 Matheson, R., 156 (Z.)
 — & Hinman, E. H., 132 (Z.)
 Mathew, K. C., 333 (Mal.)
 Mathis, C., 206 (R.F.)
 — & Durieux, C., 555 (R.F.)
 —, with Nicolau & Constantinesco, 597 (Rab.)
 Mathis, M., Martin-Charpenel, G. & Kolochine, G., 575 (Y.F.)
 Matono, A., (86), 426 (Hel.)
 Matras, A., 272 (Der.)
 Mattei, R. M., 44 (Hel.)

- Matters, R. F., with Hicks & Mitchell, 518 (Misc.)
 Mattlet, G., (538) (Misc.), 736 (Hel.)
 Mauritius, 180 (Lab.)
 Maxcy, K. F., with Pinkerton, 17 (Fev.)
 Mayer, M., (469) (B.R.), 474 (Z.)
 — & Nauck, E. G., 811 (Misc.)
 Mayfield, C. R., with Havens, 601 (Rab.)
 Mayne, B., 689 (Mal.)
 — & Griffiths, T. H. D., 347 (Mal.)
 Mazza, S., 306, 658 (S.S.)
 — & Arias Aranda, C., 117 *bis*, (120) (K.A.)
 — & Canal Feijóo, E. J., (278) (Der.)
 — & De los Rios, M., 119 (K.A.), (330) (Myc.)
 —, Niño, F. L., Quintana, H. & Bernasconi, V., (330) (Myc.)
 — & Pasquini Lopez, C., (278) (Der.)
 — & Quintana, H. & De los Rios, M., (278) (Der.)
 Medulla, C., 193 (Rab.)
 Meidinger, F. E., 41 (Hel.)
 de Meillon, B., 139, 144, 477 (Z.)
 —, with Schüffner, Swellengrebel & Annecke, 693 (Mal.)
 —, with Swellengrebel & Annecke, (364) (Mal.)
 Meira, J. A., 841 (Z.)
 Meleney, H. E., with Engman, Jr., 254 (Am.)
 —, with Milam, 249 (Am.)
 Mellanby, K., 823 (Z.)
 de Mello, F., (244) (Misc.), 255 (Am.)
 — & Brás de Sá, 359 (Mal.)
 —, with Vernencar, R. S. P., (721) (Mal.)
 Menk, W., with Schlossberger, 812 (Misc.), 854 (Z.)
 Menon, T. B., 398 (B.R.)
 Mer, G., 144 (Z.)
 —, with Kligler, 344, 360 (Mal.)
 Mesnard with Roton, 116 (K.A.)
 Mesnard, J., 338 (Mal.)
 — & Bordes, L. A., (363) (Mal.)
 — & Genevray, J., 684 (Chl.)
 —, with Morin, (364) (Mal.)
 Mesnil, F., 306 (S.S.)
 Messik, K. E., 113 (K.A.)
 Mexico, Instituto de Biología de la Universidad Nacional, (86) (Hel.)
 Meyer, A., 621 (Pel.)
 Meyer, K., 390 (C.Bu.)
 — & Anders, H. E., 729 (C.Bu.)
 Meyer, K. F., 188 (Rab.)
 Meyerhof, M., 434 (Oph.)
 Mhaskar, K. S. & Caius, J. F., 162 (Z.)
 Michail, D., with Baroni, 435 (Oph.)
 — & Vancea, P., 435 (Oph.)
 Mickaniewski, 666 (Bl.)
 Milam, D. F. & Meleney, H. E., 249 (Am.)
 Milani, C. & Cuboni, E., 354 (Mal.)
 Milella, A., (494) (Z.)
 Miller, H. M., Jr., 53, 415 *bis*, 748 *bis* (Hel.)
 — & Gardiner, M. L., 748 (Hel.)
 — & Massie, E., 415 (Hel.)
 Miller, J. J., Jr., McCoy, O. R. & Bradford, W. L., 764 (Hel.)
 Millous, Raboisson & Pluchon, 573 (Y.F.)
 Mills, E. A. & Machattie, C. with Chadwick, C. R., 505 (K.A.)
 —, with — & —, 117 (K.A.)
 Mills, E. S., 50 (Hel.)
 Milne, J., 463 (Sp.)
 Missiroli, A., 691 (Mal.)
 —, with Hackett, 692 (Mal.)
 —, with — & Martini, 832 (Z.)
 —, with Martini & Hackett, 480 (Z.)
 Misugi, Y., with Kimura & Fujisawa, 785 (Fev.)
 Mitamura, T., with Nagayo, Miyagawa, Tamiya, Sato, Hazato, & Imamura, 25 (Fev.)
 —, with —, Sato, Miyagawa, Tamiya & Hazato, 784 (Fev.)
 —, with —, Tamiya & Hazato, 18 (Fev.)
 —, with —, — & Sato, 25 (Fev.)
 Mitchell, M. L., with Hicks & Matters, 518 (Misc.)
 Mitra, P. N., 545 (Lep.)
 Mitra, S., 309 (Misc.)
 Miyagawa, Y., with Nagayo, Mitamura, Tamiya, Sato, Hazato & Imamura, 25 (Fev.)
 —, with —, — & Sato, 25 (Fev.)
 —, with —, Sato, Mitamura, Tamiya & Hazato, 784 (Fev.)
 —, & Okada, R., 67 (Hel.)
 Miyao, I., 724 (Y. & S.)
 Miyazawa, M., with Nishibe & Hosono, 785, 786 (Fev.)
 Moffat, H. A., (538) (Misc.)
 Moftah, S. G. & Nabih, M. S., 604 (Rab.)
 Mohammed, A. S., 85, 411, 430 (Hel.)
 Moissonnier, with Gérard & Welti, 577 (Y.F.)
 Moldawska-Kritschewskaya, W. D., with Tsechnowitz, 717 (Mal.)
 Mollaret, P., with Guillain & Lereboullet, (100) (Pel.)
 Mollison, W. M., 248 (B.R.)
 de Monbreun, W. A. & Goodpasture, E. W., 393, 395 (G.V.)
 Monge, C., 464 *bis* (Sp.)
 — & Weiss, P., (31) (Fev.)
 Monier, H. M., (721) (Mal.), 844 (Lep.)
 —, with Martin (284 S.S.)
 Monnier, with Marquézy & Borrien, 499 (K.A.)
 Monserrat, C., 387 (Y. & S.)
 Montañés, P., (851) (Lep.)
 de Monte, A. J., with Pasricha & Gupta, 315 *ter* (Misc.), 381, 684 *bis* (Chl.)
 Monteiro, J. L., 17 *bis*, 447, 778, (795) (Fev.)
 —, da Fonseca, F. & Prado, A., 448 (Fev.)
 Montel, M. L. R., 848 (Lep.)
 Montgomerie, R. F., 413 (Hel.)
 Montpellier, J., Catanei, A. & Lefranc, 329 (Myc.), 861 (Der.)
 Mooij, W., 688 (Mal.)
 Morales, R., 275 (Der.)
 Morales-Otero, P., 269 (Lep.)
 Morax, V., 436 (Oph.)
 Morenas, L., 747 (Hel.)
 Moreno Perez, I., 532 (Misc.)
 Morgan, D. O., 59, (86) (Hel.)
 Morgan, F. G., with Kellaway, 852 (Z.)
 Morgan, M. T., (382) (Chl.)
 Morin, H. G. S., (363), (721) (Mal.)
 Morin, H., 338, 339 (Mal.)
 — & Mesnard, J., (364) (Mal.)
 Morishita, K., (364) (Mal.), 479 (Z.)

Morishita, K., with Koidzumi, 828 (Z.)
 Morison, J., 519 (Misc.)
 Morquio, L., 416 (Hel.)
 Morrell, C. A., with Wakeman, 200 (Y.F.)
 Morris, E. S., 443 (Fev.)
 Morris, H. H., 497 (K.A.)
 Morris, K. R. S., 628 (S.S.)
 —, with Saunders, 627 (S.S.)
 Morris, K. S., with Saunders, (659) (S.S.)
 Morrison, 741 (Hel.)
 Morrow, H., (554) (Lep.)
 Morton, C. B. & Archer, V. W., 417 (Hel.)
 Moss, M. C., with Kesten, Ashford, Benham & Emmons, 860 (Der.)
 Mossman, W. G., with Eberson, 558 (R.F.)
 Mossop, M. C., with Fuller, 145 (Z.)
 Mostajo, B., Long, J. D. & Eskey, C. R., 370 (Pl.)
 Motais, F., (433) (Hel.)
 Motta, J., 545 (Lep.)
 Mottat, J., (554) (Lep.)
 Mottoulle, L., 216 (Misc.)
 Moufel, P., 720 (Mal.)
 Moya, J. C., with Thonnard-Neumann & Brewster, 324 (Myc.)
 Mühlens, P., 706 (Mal.), 771 (Hel.)
 — & Fischer, O., 706 (Mal.)
 Muir, E., 262, 548 (Lep.)
 — & Chatterji, S. N., 847 (Lep.)
 Muir, J. B. G., 752 (Hel.)
 Mukerji, A. K., with Maplestone, 414, 417 (Hel.)
 Mukerji, D. M., 782 (Fev.)
 Mukerji, S., 130 (Z.)
 Mukherjee, H. N. & Gupta, P. C., 234 (Misc.)
 Mukherji, B., with Chopra, 529, 530 (Misc.)
 Mulder, J., Bonne, C. & Sardjito, M., 204 (Lept.)
 Müller, G., (433) (Hel.)
 Müller, H., with Bonne, Kouwenaar & Vos, J. J. T., 242 (Misc.)
 Mumford, R. H., 230 (Misc.)
 Muraz, G., 658 (S.S.)
 — & Vaisseau, G., 642 (S.S.)
 Muraz, M., 287 (S.S.)
 Murdoch, F. F. & Smart, T. L., 151 (Z.)
 Murgatroyd, F., with Yorke, 350 (Mal.)
 —, with — & Hawking, 293 (S.S.)
 de Muro, P., (260) (Am.)
 —, with Thomson, 652 (S.S.)
 Murray, F. J. & Koh, P. K., (588) (Am.)
 Murray, G. A., 441 (Fev.)
 Murthi, K. N., 7 (Sp.)
 —, with Pillai, 8 (Sp.)
 Murthy, K. N., with Malcomson, 3 (Sp.)
 Musgrave, W. E., (260) (Am.)

N

Nabih, M. S., with Mof tah, 604 (Rab.)
 Nadessin, with Aubin, 81 (Hel.)
 —, with Soulage, 847 (Lep.)
 Nagayo, M., Miyagawa, Y., Mitamura, T., Tamiya, T., Sato, K., Hazato, H. & Imamura, A., 25 (Fev.)
 —, Sato, K., Miyagawa, Y., Mitamura, T., Tamiya, T. & Hazato, H., 784 (Fev.)
 —, Tamiya, T., Mitamura, T. & Hazato, H., 18 (Fev.)

Nagayo, M., Tamiya, T., Mitamura, T. & Sato, K., 25 (Fev.)
 Nagoya, T., (433) (Hel.)
 Naidu, B. P. B. & Avari, C. R., 675 (Pl.)
 — & Mackie, F. P., 373 (Pl.)
 — & Sathe, R. G., 675 bis (Pl.)
 Nainggolan, F. J., (843) (Z.)
 Najera, L., 631 (S.S.), (772) (Hel.)
 Nakajima, K., (433) bis, (772) (Hel.)
 Nakamura, M., with Kitamura, (772) (Hel.)
 Nakamura, S., with Ohmori, Okamoto, Hara & Kurokawa, 615 (Bb.)
 Nakatomi, I., 258 (Dys.)
 Nandi, P. & Ganguly, R., 62 (Hel.)
 Napier, L. E., 144 (Z.), 500 (K.A.)
 —, with Boyd & Roy, 312 (Misc.)
 —, Butcher, D. & Gupta, C. R. D., 709 (Mal.)
 — & Campbell, H. G. M., 700 (Mal.)
 — & Gupta, B. M. D., 707 (Mal.)
 —, with Gupta, C. R. D., 106 (K.A.)
 — & Henderson, J. M., 114 (K.A.)
 — & Krishnan, K. V., 495 (K.A.)
 —, — & Lal, J. C., 719 (Mal.)
 —, with — & —, 870 (K.A.)
 Nash, T. A. M., 147 (Z.)
 National Medical Journal of China, 248 (B.R.)
 Nattan-Larrier, L., 108 (K.A.), 298 (S.S.)
 — & Noyer, B., 301, 303, 651 (S.S.)
 —, — & Bedier, E., 651 (S.S.)
 Nauck, E. G., 276 (Der.), (469) (B.R.)
 —, with Mayer, 811 (Misc.)
 —, with Schapiro, 419 (Hel.)
 Naudi, J., (86) (Hel.)
 Nayyar, K. & Pillai, A. K., 857 (Oph.)
 Nazmi, M., 33 (Hel.)
 Negrie, with Le Chuiton, 101 (Und.)
 Negroni, P., 322 ter (Myc.)
 —, with Etchevarne, 861 (Der.)
 Nepveux, F., with Labbé & Nichita, 121 (Z.)
 Neri, F., (364) (Mal.)
 Netter, A., 20, 773 (Fev.)
 Neuland-Dobrowa, M., 35 (Hel.)
 Neumann, H., 648 (S.S.)
 —, with Schilling, 649 (S.S.)
 New Guinea, Territory of, 802 (Misc.)
 Newman, B. M., with Grant & Wood, 836 (Z.)
 Newman, C., 88 (B.R.)
 Newman, S. P., with Dawson, 352 (Mal.)
 Nguyen-van-Khai, 610 (Bb.), 685 (Chl.)
 Nguyen-van-Lieng, with Bordes, (362) (Mal.)
 Nichita, with Labbé & Nepveux, 121 (Z.)
 Nicol, W. D., with James & Shute, 693 (Mal.)
 Nicolau, C. T., 389, 728 quat. (C.Bu.)
 — & Gingold, N., (364) (Mal.)
 Nicolau, M. S. & Kopciowska, L., 600 (Rab.)
 Nicolau, S., Cruveilhier, L. & Kopciowska, L., 601 bis (Rab.)
 —, Mathis, C. & Constantinesco, V., 597 (Rab.)
 Nicolle, C., 444, 790 (Fev.), 533 (Misc.)
 — & Anderson, C., 556 bis (565), (R.F.)
 —, — & Laigret, J., 557 (R.F.)
 — & Balozet, L., 598 (Rab.)
 — & Laigret, J., 774 (Fev.)
 Nicolle, P., with Launoy & Prieur, 644 (S.S.)
 Nielsen, F. O., with Aars, 387 (Y. & S.)
 Nieschulz, O., (163) (Z.)

Nieschulz, O. & Bos, A., (163) (Z.)
 Nieuwenhuis, A. W., 362 (Mal.)
 Niño Astudillo, J., with Hill, 821 (Z.)
 Niño, F. L., (278) (Der.), (330) *bis* (Myc.)
 —, Fernandez, J. & Palant, M., (278) (Der.)
 —, with Mazza, Quintana & Bernasconi, (330) (Myc.)
 Nishibe, M., Hosono, S. & Miyazawa, M., 786 (Fev.)
 —, Miyazawa, M. & Hosono, S., 785 (Fev.)
 Nishimura, F., 73 (Hel.)
 Nishimura, H., with Ando & Kurauchi, 369 (Pl.)
 van Nitsen, R., 216 (Misc.), 703 (Mal.)
 Nitzulescu, G. & Nitzulescu, V., (164) (Z.)
 Nitzulescu, V., 145, (164) (Z.)
 Nocht, B., (244) (Misc.)
 Nolasco, J. O., 849 (Lep.)
 Nolf, L. O., 750 (Hel.)
 Nomura, S. & Akashi, K., 442 (Fev.)
 Normet, L., 376 (Chl.)
 Noronha, A. J., 84, 432 (Hel.)
 North, E. A., with Cilentio, 551 (Lep.)
 Nouchy, A., with Benhamou & Gille, 115 (K.A.)
 Nowak, H., 60 (Hel.)
 Noyer, B., with Nattan-Larrier, 301, 303, 651 (S.S.)
 —, with — & Bédier, 651 (S.S.)
 Nuzum, F. R., Elliot, A. H. & Priest, B. V., 125 (Z.)

O

Obitz, K., (494) (Z.)
 Ochoterena, I., 85 (Hel.)
 —, with Uruena, 860 (Der.)
 O'Connor, F. W., 252 (Am.), (397) (Misc.), 427, 766 (Hel.)
 — & Hulse, C. R., 765 (Hel.)
 Oelsnitz & Liotard, M., 498 (K.A.)
 d'Oelsnitz, M., 874 (K.A.)
 Office International d'Hygiène Publique, 232 (Misc.)
 Ogata, N., 27 (Fev.)
 —, with Ishiware, 788 (Fev.)
 Ohmori, K., Okamoto, H., Hara, M., Nakamura, S. & Kurokawa, K., 615 (Bb.)
 Ohtawara, T. & Ichihara, T., 552 (Lep.)
 Okada, R., 65 (Hel.)
 —, with Miyagawa, 67 (Hel.)
 Okamoto, H., with Ohmori, Hara, Nakamura & Kurokawa, 615 (Bb.)
 Oldham, J. N., 54 (Hel.)
 O'Leary, P. A., with Eusterman, 95 (Pel.)
 Olinger, M. T., with Barber, 331 (Mal.)
 Oliveira, C. J., with Rosedale, (618) (Bb.)
 Oliver, W. W., de Leon, W. & de Roda, A. P., 550 (Lep.)
 Olmer, D., (260) (Am.)
 —, Botreau-Roussel, P. & Blanchard, M., (260) (Am.)
 — & Olmer, J., 456 (Fev.)
 Olmer, J., 115 (K.A.)
 Ono, I., with Watanabe & Harasawa, 851 (Lep.)
 Orenstein, A. J., 241 (Misc.)
 Ornstein, I., with Ballif, 622 (Pel.)

Orr, J. B. & Gilks, J. L., 233 (Misc.)
 Ortiz de Landazuri, E., 821 (Z.)
 Osterberg, A. E., with Brown, 256 (Am.)
 Ota, M., 324 (Myc.)
 — & Kawatsuré, S., 325 (Myc.)
 — & Sato, S., 268, 551 (Lep.)
 Ott, 660 (Bl.)
 Otten, L., 372, 673 (Pl.)
 Otto, G. F., 749, 751 (Hel.)
 — & Cort, W. W., 64 (Hel.)
 —, — & Keller, A. E., 56 (Hel.)
 Otto, R., 173 (Z.)
 Ouchakov, V., 603 (Rab.)
 Owen, H. B. & Hennessey, R. S. F., 431' (Hel.), 434, 438 (Oph.)
 Oyarzun, R., with Sievers, 745 (Hel.)

P

Pagonis, A., with Lépine & Caminopetros, 566 (Lept.)
 Pai, M. N., 19 (Fev.)
 Palant, M., with Niño & Fernandez, (278) (Der.)
 Palau, with Perepérez, 738 (Hel.)
 Palawandow, H. & Serebrennaja, A. I., 191 *bis* (Rab.)
 Paldrock, A., 548 (Lep.)
 Palmowitch, S., with Remlinger & Bailly, 189, 190, 192 *bis* (Rab.)
 Palthe, P. M. v. W., 814 (Misc.)
 Pampana, E., with Alessandrini & Sabatucci, 398 (B.R.)
 Pampana, E. J., with Puntoni, 860 (Der.)
 Panayotatou, A., 212 (R.F.), 382 *bis* (Chl.), (625) (Pel.)
 Pandit, C. G., with King, 486 (Z.)
 — & Rao, R. S., 683 *bis* (Chl.)
 Pangalos, G., with Lepine & Caminopetros, 775 (Fev.)
 Papagheorghiou, S., with Joannides & Angelo, 329 (Myc.)
 Papayoannou, A., with Lépine & Markianos, 850 (Lep.)
 Pardo-Castello, V., 862 (Der.)
 Paris Eguilaz, H., 629 (S.S.)
 Parrot, I., 481 (Z.)
 —, Donatien, A. & Lestoquard, F., 504 (K.A.)
 —, with Sergent, Edm., Sergent, Et., Foley, Catanei & Senevet, 332 (Mal.)
 Pascal, J. M., (120) (K.A.)
 Pasquini Lopez, C., with Mazza, (278) (Der.)
 Pasricha, C. L., de Monte, A. J. & Gupta, S. K., 315 *ter* (Misc.), 381, 684 *bis* (Chl.)
 Pasteur, F., with Phisalix, 854 (Z.)
 Paterson, A. S., 62 (Hel.)
 Paterson, J. C., 768 (Hel.)
 van Patot, P. N. T., 808 (Misc.)
 Patto, O., 596 (Rab.)
 Pavy, A. B., 91 (Bb.)
 Pawan, J. L., with Hurst, 187, 595 (Rab.)
 Pawlowsky, E., 109 (K.A.)
 Pawlowsky, E. N. & Stein, A. K., 156 (Z.)
 Payne, G. C. & Payne, F. K., 64 (Hel.)
 Peak, I. F., 517 (Misc.)
 Pecori, G., (795) (Fev.)
 — & Escalar, G., (364), (721) (Mal.)
 Pédat, with Vigne, (271) (Lep.)

- Peel, E., with Bourguignon, (362) (Mal.)
 Peirier, 266 *ter*, 547 (Lep.)
 Peña Chavarria, A., Serpa, R. & Bevier, G., 202 (Y.F.)
 Penington, R. G., (260) (Am.)
 Penso, G., 307 (Misc.), 765 (Hel.), 819 (Z.)
 Perekropoff, G. I. & Stepanoff, P. I., 484 (Z.)
 Perepérez, F. & Palau, 738 (Hel.)
 Pergher, J., 735 (Hel.)
 Perkins, W. H., 61 (Hel.)
 Peruzzi, M., 258 (Dys.), 308 (Misc.), (260) (Am.)
 Peter, F. M., 705 (Mal.)
 Peters, R. A., with Jansen, Kinnersley & Reader, 92 (Bb.)
 Petitdidier, with Velu & Eyraud, 504 (K.A.)
 Petresco, with Labbé, Boulin & Besançon, 328 (Myc.)
 Petridis, P., (260) (Am.)
 Petrovych, A., 72 (Hel.)
 Petrowych, A., 307 (Misc.)
 Pettit, A. & Aguessy, C. D., 576 (Y.F.)
 — & Stefanopulo, G., (203), (579) (Y.F.)
 Petzetakis, 794 (Fev.)
 Petzetakis, M., 566 (Lept.)
 — & Kyriazides, K., (568) (Lept.)
 Pezzi, G., 272 (Der.)
 Philip, C. B., 134, 135, 156 (Z.)
 —, with Davis, 132 (Z.)
 Phisalix, 854 (Z.)
 — & Pasteur, F., 854 (Z.)
 Photakis, B., with Caminopetros & Phylactos, 727 (C.Bu.)
 Phylactos, A., with Caminopetros & Photakis, 727 (C.Bu.)
 Picon, R. R., 128 (Z.)
 Piebenga, P. J., 710 (Mal.)
 Pieraerts, G., 454 *bis* (Fev.)
 Pieri, G., (772) (Hel.)
 Pijper, A. & Dau, H., 452, 779 (Fev.)
 —, with Goldberg, 275 (Der.)
 —, with Troup, 452 (Fev.)
 Pillai, A. K., with Nayar, 857 (Oph.)
 Pillai, M. J. S. & Murthi, K. N., 8 (Sp.)
 Pillat, A., 434 (Oph.)
 Pilot, I. & Levin, I. M., 50 (Hel.)
 Pinelli, A., (507) (K.A.)
 Pinkerton, H. & Maxcy, K. F., 17 (Fev.)
 Pinoy, E. P. & Fabiani, G., 851 (Lep.)
 Pinto, C. & di Primio, R., 156 (Z.)
 Pinto, G. de S., 143 (Z.)
 Piquet, L., 671 (Pl.)
 Pirami, E., 351 (Mal.)
 — & Tassi, G., (364) (Mal.)
 Pirot, with Plazy, Marcandier & Germain, 21 (Fev.)
 Pirot, R., 404 (Hel.)
 —, with Marcandier, 450, 777 (Fev.), 487 (Z.)
 —, with —, Plazy & Le Chuiton, 20 (Fev.)
 Pitot, (397) (Misc.)
 Pittaluga, G. & Goyanes, J., (433) (Hel.)
 Placidi, T., 611 (Bb.), 801 (Misc.)
 Plantilla, F. C., with Rodriguez, 268 (Lep.)
 Plantureux, E., 195, 607, (608) (Rab.)
 Platonow, N. W. & Frolowa, W. T., 738 (Hel.)
 Plazy, with Dargein, (259) (Am.)
 — & Germain, 792 (Fev.)
 —, — & Marcandier, 115 (K.A.)
 —, Marcandier, Germain & Pirot, 21 (Fev.)
 —, with —, Le Chuiton & Pirot, 20 (Fev.)
 Plazy, L., — & Plazy, M., 792 (Fev.)
 Plotz, M., 414 (Hel.)
 Pluchon, with Millous & Raboisson, 573 (Y.F.)
 Podyapolskaya, W. P., with Scriabine & Schoulz, 48 (Hel.)
 Poindexter, H. A., 816 (Z.)
 —, with Linton, 298 (S.S.)
 Poma, C. S., (120) (K.A.)
 Pomeroy, A. W. J., 474 (Z.)
 Pons, J. A., 527 (Misc.)
 —, with Ashford, 462 (Sp.)
 —, with Del Toro & Rodriguez Molina, 78 (Hel.)
 Pons, R., 678 *bis* (Pl.)
 — & Durieux, C., 678 (Pl.)
 Ponto, S. A. S., with Krijgsman, 489 (Z.)
 Porter, F. E., 801 (Misc.)
 Portugal, H., with Rabello, 268 (Lep.)
 Posselt, A., (772) (Hel.)
 Postmus, S. & Schultsz, T. W., 568 (Lept.)
 Potapenko, N. A. & Goutséwitch, A. W., 55 (Hel.)
 Pottier, R., 848 (Lep.)
 Pouchet, 39 (Hel.)
 Pozzi, A., (364) (Mal.)
 Pradal & Souchard, 485 (Z.)
 Prade, J. V., with Des Essarts, 456 (Fev.)
 Prado, A., with Monteiro & da Fonseca, 448 (Fev.)
 Priest, B. V., with Nuzum & Elliot, 125 (Z.)
 Priest, R. C., (364) (Mal.)
 Prieur, M., with Launoy & Nicolle, 644 (S.S.)
 Prigge, R., with Kolle & Rothermundt, 209 (R.F.)
 di Primio, R., with Pinto, 156 (Z.)
 Pruthi, H. S., 143 (Z.)
 Public Health Reports, 203, (203) (Y.F.)
 Punsalang, J. V., with Lopez Rizal & Sian, 680 (Chl.)
 Puntoni, V. & Pampana, E. J., 860 (Der.)
 Purcell, F. M., 752 (Hel.)
 Purchase, H. S., with Taylor, 61 (Hel.)
 Puri, I. M., 166, 167 (B.R.)
 —, with Christophers, 137, (163) (Z.)

Q

- Quaife, W. T., 317 (Misc.)
 Quastel, J. H., 295 (S.S.)
 Quenardel, 379 (Chl.)
 Quéral des Essarts, J., (260) (Am.)
 Quintana, H., with Mazza & De los Rios, (278) (Der.)
 —, with —, Niño & Bernasconi, (330) (Myc.)

R

- Rabello, Jr., 546 (Lep.)
 — & Portugal, H., 268 (Lep.)
 Raboisson, with Millous & Pluchon, 573 (Y.F.)

- Radsivilovskij, G. L., with Chodukin, Sofieff & Schevtschenko, 116 (K.A.)
 Radsma, W., 235 *bis* (Misc.)
 Ragab, A., with Biggam, (259) (Am.)
 —, with — & Halawani, 256 (Am.)
 Ragirot, with Lavau, Souchard, Farinaud & Lieou, 205 (Lept.)
 Rahoerson, R., with Hérivaux, 259 (Dys.)
 Ramanujayya, R., 3 (Sp.)
 Ramsay, G. W. St. C., 722 (Y. & S.)
 Rao, B. A., with Sweet, 478 (Z.)
 Rao, D. K., with Dikshit, 501 (K.A.)
 Rao, G. R., 849 (Lep.)
 — & Roy, A. T., 553 (Lep.)
 Rao, M. G. R., 85 (Hel.)
 Rao, R. S., with Pandit, 683 *bis* (Chl.)
 Rao, S. R., with Walker & Chenoy, 486 (Z.)
 Rao, S. S. & Iyengar, M. O. T., 426 (Hel.)
 Rasmeritza, E., 687 (Mal.)
 Ratcliffe, H. L., 124 (Z.), 257 (Am.)
 Ravaut, P., with Levaditi, Lépine & Cachera, 392 (C.Bu.)
 —, with —, — & Schoen, 391, 392 (C.Bu.)
 —, with — & Schoen, 726 *bis*, 727 (C.Bu.)
 Raybaud, A., 372 (Pl.)
 —, with Arnaud, 372 (Pl.)
 — & Guglielmi, F., 372 (Pl.)
 de Raymond, A., 266 *ter* (Lep.), 666 (Bl.), 682 (Chl.)
 Raynal, 810 (Misc.)
 Raynal, J., 430 (Hel.), 445 (Fev.), 690 (Mal.)
 Read, B. E., 406 (Hel.)
 Reader, V., with Jansen, Kinnersley & Peters, 92 (Bb.)
 Rebagliati, R., (364) (Mal.)
 Redmond, J. J., 799 (H.S.)
 Redslob, E., 436 (Oph.)
 Reed, A. C., 232 (Misc.)
 —, Anderson, H. H., David, N. A. & Leake, C. D., 583 (Am.)
 —, with Anderson, (259) (Am.)
 Regendanz, P., 455 (Fev.)
 —, with v. Brand, 299 (S.S.)
 — & Reichenow, E., 161 (Z.)
 Reichenow, E., 121 (Z.)
 —, with Regendanz, 161 (Z.)
 Reimann, H. A. & Kurotchkin, T. J., 327, 328 (Myc.)
 Reiner, L. & Leonard, C. S., 646 *bis* (S.S.)
 Reiss, F., with Freund, 390 (C.Bu.)
 Reitano, U. & Boncinelli, U., (795) (Fev.)
 Remlinger, P., 597 (Rab.)
 — & Bailly, J., 189, 193, 194, 596, 597, 599, 607 *ter* (Rab.)
 —, Manouélian & Bailly, 605 (Rab.)
 —, Palmowitch, S. & Bailly, J., 189, 190, 192 *bis* (Rab.)
 Reynolds, F. H., (669) (Bl.)
 Reynolds, F. H. K., with Simmons, St. John & Holt, 13 (Fev.)
 Reyntjens, P., 686 (Mal.)
 Rho, F., 579 (Y.F.)
 Rice, J. B., with Barber & Brown, 686 (Mal.)
 Richet, C., Jr & Dublineau, J., 645 (S.S.)
 Richmond, A. E., 334 (Mal.)
 Richter, C. S., with Aalsmeer, 92 (Bb.)
 Ricou, 525 (Misc.)
 Ricou & Tran-van-Tam, 683 (Chl.)
 Ridout, G. B., with Thomas, 350 (Mal.)
 Riker, A. D., with Weller, 328 (Myc.)
 Riou, M., with Toullec, 46, 412 (Hel.)
 Rivnay, E., 488 (Z.)
 Rizzo, A., 874 (K.A.)
 Robbins, B. H., with Lamson, Brown & Ward, 56 (Hel.)
 Roberts, J. I., with Symes, 837 (Z.)
 Robic, J., with Girard & Hérivaux, 839 (Z.)
 Robineau, 262 (Lep.)
 —, with Sorel, 280 (S.S.)
 da Rocha Lima, H., (469) (B.R.)
 Rockefeller Foundation, 246 (B.R.)
 de Roda, A. P., with Oliver & de Leon, 550 (Lep.)
 Rodenwaldt, E., with Swellengrebel, 468 (B.R.)
 Rodhain, J., 428 (Hel.)
 — & Dubois, A., 83, 428 (Hel.)
 Rodriguez, J., 540, 543 (Lep.)
 — & Plantilla, F. C., 268 (Lep.)
 Rodriguez-Molina, R., with Bachman, 761 (Hel.)
 —, with Del Toro & Pons, 78 (Hel.)
 —, with Stumberg, 68 (Hel.)
 Roger, H., (271) (Lep.)
 Rogers, L., 536 (Misc.)
 — & Cooke, W. E., 465 (Sp.)
 Rohlfing, E. H., with Tsuchiya, 747 (Hel.)
 Rojas, L., 600 (Rab.)
 Romanowa, K., with Roskin, 353 (Mal.)
 Romiti, C., 80 (Hel.)
 Ronnefeldt, F., 518 (Misc.)
 Roques, 437 (Oph.)
 Roques, P., 857 (Oph.)
 Rosa, A., with Arias Aranda, 117 (K.A.)
 da Rosa, A. F., with da Fonseca, 324 (Myc.)
 Rosedale, J. L. & Olveiro, C. J., (618) (Bb.)
 Rosenfeld, H., 390 (C.Bu.)
 —, with Löhe, 730 (C.Bu.)
 Roskin, G. & Romanowa, K., 353 (Mal.)
 Rosner, S., 276 (Der.)
 Ross, G. R., 589 (Bl.)
 Ross, H., with Wooley, 552 (Lep.)
 Ross, R., 238 (Misc.)
 Rothmundt, M., with Kolle & Prigge, 209 (R.F.)
 Roton & Mesnard, 116 (K.A.)
 Rotter, W., 65 (Hel.)
 Roubaud, E., 140, 141, 154 *bis*, 831 *bis* (Z.)
 — & Colas-Belcours, J., 489, 835 *bis* (Z.)
 — & Gaschen, H., 141, 828 (Z.)
 —, with Magrou, J. & Magrou, M., 134 (Z.)
 Rousset, J., with Garin & Gonthier, 39, 756 (Hel.)
 Routledge, W. U. & Kelly, R., (625) (Pel.)
 Row, R., 113 (K.A.)
 Roy, A., 546 (Lep.)
 Roy, A. C., with Boyd & Napier, 312 (Misc.)
 Roy, A. T., with Rao, 553 (Lep.)
 Roy, D. N., 481 *ter* (Z.)
 —, with Strickland, 710 (Mal.)
 Royal Coll. Phys. London, Cttee. on Nomenclature of Diseases 594 (B.R.)
 Rubinstein, P. L. & Kapusto, M. L., 210 (R.F.)
 —, with Kritschewski, 211 (R.F.)

- Ruge, R., 231, 516 (Misc.), 273 (Der.), 697 (Mal.)
 Ruggero & Santillana, 500 (K.A.)
 Rule, A. M., with Kolmer, 645 (S.S.)
 Rumreich, A., with Ceder, Dyer & Badger, 447 (Fev.)
 —, with Dyer & Badger, 444 (Fev.)
 —, with —, Ceder & Badger, 16, 446 (Fev.)
 —, with —, —, Lillie & Badger, 446 (Fev.)
 —, with —, —, Workman & Badger, 447 (Fev.)
 —, with —, Workman & Badger, 777 (Fev.)
 —, with —, —, Ceder & Badger, 777 (Fev.)
 Russell, A. J. H., 685 (Chl.)
 Russell, F. F., 575 (Y.F.)
 Russell, H., with Taylor, 667 (Bl.)
 Russell, H. M., (565) (R.F.)
 Russell, P. F., 140, 479, 834 (Z.), 353, 691 (Mal.)
 —, with Holt, 341 (Mal.)
 Russell, W. K., 734 (B.R.)
 Rutledge, W. U. & Kelly, R., (625) (Pel)
- S**
- Sabatucci, M., with Alessandrini & Pampana, 398 (B.R.)
 Sabinin, A., with Bokalo, Wedischschew, Jegorow & Grikurow, 679 (Pl.)
 Sabry, I., 97 *ter* (Pel.)
 Saha, B., 111 (K.A.)
 St. John, J. H., 714 (Mal.)
 — & Holt, R. L., 441 (Fev.)
 —, with Simmons, Holt & Reynolds, 13 (Fev.)
 Saisawa, K., 569 (R.B.F.)
 Sala Ginabreda, J. M., 498 (K.A.)
 Salaün, G., with Vaucel, 288 (S.S.), 536 (Misc.)
 —, with — & Boisseau, 597 (Rab.)
 Salem, H. H. (494) (Z.)
 Salem, L., with Schneider, 598 (Rab.)
 Salle, A. J., 502, 503 (K.A.)
 Sambon, M., 720 (Mal.)
 — & Estas, P., 537 (Misc.)
 —, with —, (244) (Misc.), (363 *bis*) (Mal.)
 Sampson, B. F., 663 (Bl.)
 Samson, J. G., with Cruz & Abuel, 549 (Lep.)
 Samuels, W. F., 336 (Mal.)
 Sanders, J. P., 352 (Mal.)
 Sanderson, G. M., 468 (B.R.)
 Sandground, G. J. H., 736 (Hel.)
 Sandground, J. H., 69 (Hel.)
 Sanfilippo, E., 101 (Und.)
 Sanjurjo, D. & Sanjurjo, M., 553 (Lep.)
 Sanjurjo, M., with Sanjurjo, 553 (Lep.)
 Santillana, with Ruggero, 500 (K.A.)
 Santillana, A., with Uzan, 870 (K.A.)
 Santonastaso, A., 856 (Oph.)
 Santos Zetina, F., 506 (K.A.), (538) (Misc.)
 Sarathy, M. K. P., 687 (Mal.)
 —, with Iyengar, 823 (Z.)
 Sardjito, (205) (Lept.)
 Sardjito, M., with Mulder & Bonne, 204 (Lept.)
 — & Sitanala, J. B., 848 (Lep.)
 Sargent, W. S., 93 (Bb.)
 Sarkar, S. L., (93) (Bb.)
 Sathe, R. G., with Naidu, 675 *bis* (Pl.)
 Sato, K., 780 (Fev.)
 —, with Nagayo, Miyagawa, Mitamura, Tamiya & Hazato, 784 (Fev.)
 —, with —, —, —, —, — & Imamura, 25 (Fev.)
 —, with —, Tamiya & Mitamura, 25 (Fev.)
 Sato, S. & Kodama, T., 602 (Rab.)
 —, with Ota, 268, 551 (Lep.)
 Saunders, G., 626 *bis*, 640 (S.S.)
 — & Morris, K. S., (659) (S.S.)
 Saunders, G. F. T., 282 (S.S.)
 — & Morris, K. R. S., 627 (S.S.)
 Sannie, L., with Chaillot, 119 (K.A.)
 Sautet, J., with Coulon, (362), (720) (Mal.), 490 (Z.)
 Sawitzky, N. N., 33 (Hel.)
 Sawyer, W. A., 574, 579 *bis* (Y.F.)
 — & Frobisher, M., Jr., (579) (Y.F.)
 —, Kitchen, S. F. & Lloyd, W., 572 (Y.F.)
 — & Lloyd, W., 198 (Y.F.)
 Scaturro, A., (507), 873 (K.A.)
 Schachsuwarly, M., 667 (Bl.), (721) (Mal.)
 Schapiro, L. & Nauck, E. G., 419 (Hel.)
 Scharff, J. W., 335 (Mal.), 826 (Z.)
 Scheff, G., 651 (S.S.)
 Schevtschenko, F. J., (164) (Z.)
 —, with Chodukin, Sofieff & Radsivil-ovskij, 116 (K.A.)
 Schilling, C. & Borghi, B., 300 (S.S.)
 — & Neumann, H., 649 (S.S.)
 — & Schreck, H., 816 (Z.)
 Schilling, V., 527 (Misc.)
 Schlossberger, H., with Fischl, 733 (B.R.)
 — & Menk, W., 812 (Misc.), 854 (Z.)
 Schmelewa, A. A., 415 (Hel.)
 Schmidt, A., 764 (Hel.)
 Schmidt-La Baume, with Fischer, 729 (C.Bu.)
 Schneider, J. E. & Saleem, L., 598 (Rab.)
 Schnitzer, R., 650 (S.S.)
 Schöbl, O., 386 *quat* (Y. & S.)
 — & Hasselmann, C. M., 723 (Y. & S.)
 Schockaert, J., (570) (R.B.F.)
 Schoen, R., with Levaditi & Ravaut, 726 *bis*, 727 (C.Bu.)
 —, with —, — & Lépine, 391, 392 (C.Bu.)
 Schoening, H. W., 195 (Rab.)
 Schönhöfer, F., with Schulemann & Wingler, 353 (Mal.)
 Schoulz, G. S., with Scriabine & Podyapol-skaya, 48 (Hel.)
 Schoute, E., with de Buck & Swellengrebel, 345 (Mal.)
 Schreck, H., with Schilling, 816 (Z.)
 Schuchat, J. A., 426 (Hel.)
 Schöffner, W., 568, (569) (Lept.), 578 (Y.F.), 342 (Mal.)
 —, with Snijders & Dinger, 12 *bis* (Fev.)
 Schueffner, W. A. P., with Dinger & Snijders, (203) (Y.F.)
 —, Swellengrebel, N. H., Annecke, S. & de Meillon, B., 693 (Mal.)

- Schuyman, S., with Carrillo & Fernández, 264 (Lep.)
 Schulemann, W, 704 (Mal)
 —, Schönhöfer, F & Wingler, A, 353 (Mal)
 Schultz, T W, with Hoffmann, 503 (K A)
 —, with Postmus, 568 (Lept)
 Schut, J, 374 (Pl)
 Schütze, H, 676 (Pl)
 Schuurman, C. J & Huinink, A M S B, 152 (Z)
 Schwarz, A, 150 (Z)
 Schwarzmänn, B E, 874 (K A)
 Schweinburg, F, 601 (Rab)
 Schwetz, J, 164 (Z)
 Scott, A. V, 869 bis (K A)
 Scriabine, K I, Podyapolskaya, W P & Schoulz, G S, 48 (Hel)
 Seal, S C, 853 (Z)
 Sedat, H, 464 (Sp)
 Sellards, A W, 198, 575 (Y F)
 — & Laigret, J, 572 (Y F)
 Selwyn-Clarke, P S, (364) (Mal)
 Sembon, S, 172 (Z)
 Sen, N K, 501 (K A)
 Senevet, A, with Sergeant, Edm, Sergeant, Et, Parrot, Foley & Catanei, 322 (Mal)
 Senevet, G, 132 bis (Z), 316 (Misc), 703 (Mal)
 Senior-White, R, (164) (Z)
 Senn, E, 167 (B R)
 Sequeira, J H, (538), 809 (Misc)
 Serebrennaja, A I, with Palawandow, 191 bis (Rab)
 Sergeant, Ed, 181 bis (Lab)
 — & Sergeant, Et, 248, 881 (B R)
 — —, Parrot, L, Foley, H, Catanei, A & Senevet, A, 332 (Mal)
 Sergeant, Et, 686 (Mal)
 —, with Sergeant, Edm, 248, 881 (B R)
 —, with —, Parrot, Foley, Catanei & Senevet, 332 (Mal)
 Serpa, R, with Peña Chavarría & Bevier, 202 (Y F)
 Serra, A, 314 (Misc)
 Serra, V, (364) (Mal)
 Sévin, A, with Buttiaux, 243 (Misc)
 Seyfarth, E, with Strumpell, 594 (B R)
 Sézary, A, with Vaudremer & Brun, 550 (Lep)
 Shanks, G & De, M N, 113 (K A), 616 (Bb)
 Shannon, R C, 131, 135, 834 (Z)
 —, with Davis, 197 (Y F)
 — & Frobisher, M, Jr, (164) (Z)
 —, with —, 396 (Misc)
 —, with —, & Davis, 196 (Y F)
 Shattuck, G C & Hilferty, M M, 798 (H S)
 Shaw, F. W, 327 (Myc)
 Shelmire, B & Dove, W E, 157 (Z)
 —, with —, 450, 778 (Fev)
 Sherwani, A H K, 432 (Hel)
 Shubata, T, with Kawamura & Imagawa, 788 (Fev)
 Shillong, 519 (Misc)
 Shope, R E, 189 (Rab)
 Shorb, D A, 71 (Hel)
 Shortt, H E, 144 (Z)
 Shortt, H E, *et al*, 864 (K A)
 —, Campbell, H G M & Lal, C, 865 (K A)
 Shortt, H. E., Smith, R O A & Swaminath, C S, 107, 865, 866, 867, 868 (K A)
 —, — — — & Krishnan, K V, 107 (K A)
 — & Swaminath, C S, 471 (Z), 871 (K A)
 Shousha, A T, 379 (Chl)
 Shrivastava, D L, with Hughes, 348 (Mal)
 Shropshire, J B, 139 (Z)
 Shute, P G, with James & Nicol, 693 (Mal)
 Sian, J, 377 (Chl)
 —, with Lopez Rizal & Punsalang, 680 (Chl)
 Sicé, A, 289 (S S)
 — & Leger, M, 283 (S S)
 —, with —, 636 (S S)
 Siemens, H W, 843 (Z)
 Sievers, H K & Oyarzun, R, 745 (Hel)
 Sifferlen, with Iroisier & Cattani, 457 (Fev)
 Sikes, E K, 154 (Z)
 Silva, F, 394 (G V)
 Silva, R, 429 (Hel), 439 (Oph)
 da Silveiro, G F with Vieira, (164) (Z)
 Sumic, T, 250 bis, 580 (Am), 818 bis (Z)
 Simmons, J S, 12 bis (Fev)
 —, St John, J H, Holt, R L & Reynolds, F H K, 13 (Fev)
 Sinani, A, with Anding, 99 (Pel)
 Sinderson, H C, 118 (K A)
 Sinton, J A, (164) bis 837 (Z), (364) (Mal)
 Sioli, 705 (Mal)
 Sitanaia, J B, with Sardjito, 848 (Lep)
 Siwolobow, W, with Lenskaja, Egorow, Larionowa, Marjina, Lebedewa, Barsukowa & Dikow, 375 (Pl)
 Sklarek, B, (469) (B R)
 van Slooten, J, with Soesilo, (494) (Z)
 van Slype, W, 420 (Hel), 795 (Fev)
 Smart, T L, with Murdoch, 151 (Z)
 de Smidt, F P G, 675 (Pl)
 Smirnow, G G, 60 (Hel)
 Smut, B, 485 (Z)
 Smith, L C (721) (Mal)
 — & Elmes B G T, 235 (Misc)
 Smith J H, 623 (Pel)
 Smith M & Hundle, E, 171 (Z)
 Smith, R C, 128 (Z)
 Smith, R O A, with Shortt & Swaminath, 107, 865, 866, 867, 868 (K A)
 —, with — — — & Krishnan, 107 (K A)
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